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The *poetaz* varieties of Narcissus should be more commonly used in home gardens. (See Chapter VI.)

Spring Flowering Bulbs

HARDY AND DESIRABLE MATERIALS FOR USE IN THE HOME GARDEN

BY

CLARK L. THAYER

Department of Floriculture
Massachusetts Agricultural College

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1928

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Dedicated
to
MY MOTHER

PREFACE

HARDY spring flowering bulbs comprise a group of plants which should be used to a much greater extent in home gardens. They are adapted to such a wide range of uses and locations that a place may be found for them on almost any home property. Furthermore, they are strongly recommended because they bring color into the garden or border at an early date.

Possibly the author should apologize for writing a book on bulbs when several books on this subject have appeared so recently. However, he has the courage to hope that a place for this little volume will be found on the book-shelf of the home gardener, the man or woman who spades, plants, and cares for his or her own garden. He does not wish to convey the impression that this is a book for the professional gardener or florist; to such a reader it will prove of a decidedly amateur nature. Will such a reader kindly remember that the purpose of the book is to arouse greater interest in the use of bulbs?

Appreciation is extended to Professor Frank A. Waugh for his careful and critical reading of the manuscript, for his friendly advice, and for his

permission to use several photographs made by him.

Recognition is given to Cranfield and Clarke of New York City for the use of the photograph of a Dutch garden.

CLARK L. THAYER

Amherst,
Massachusetts

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Spring Flowering Bulbs

I

USES OF BULBS

THE hardy spring flowering bulbs are adapted to such a wide range of purposes that some location for them may be found on any home property, no matter how large or small. The city resident, with a lot possibly fifty feet by one hundred feet, can have at least a few narcissi, a few tulips, crocus, or grape hyacinths. The desires of the suburban gardener may be limited by his pocketbook only and the owner of a pretentious estate may have elaborate bulb gardens. Certainly no flower lover should be without these flowers of spring.

Unquestionably the chief reason for using bulbs in the home garden is to extend the season of bloom. In many instances such gardens are destitute of flowers until the iris begins to bloom, unless a few pansies may have

been used; without the latter, and without bulbs, there would be no color in the garden until some time in May. Why should a garden or border be without flowers in the spring for such a long time, when with the expenditure of a comparatively small amount of money, bloom could be had several weeks earlier? Beginning with the snowdrops in extremely early spring (sometimes blooming in winter), and continuing with a succession of glory-of-the-snow, scillas or squills, grape hyacinths, early tulips, hyacinths, early and late narcissi, and late flowering tulips, particularly the Darwin type, consider what a variety of form and color and how much attractiveness may be added to the garden in the early season. Most of us like to see flowers in our gardens just as long as we possibly can and bulbs are decidedly advantageous in extending the spring period. The owner of a garden in the west central part of Massachusetts once told the author that he had blooms from his garden in eleven months out of the twelve; he had snowdrops in February and chrysanthemums in December; blooms in the other months were easily provided. Possibly this gentleman could have had flowers in January by making use of the Christmas rose (*Helleborus niger*) which, however, is of un-

certain hardiness in some parts of Massachusetts. Compare the results in this garden with those of the person who is without garden flowers until the German iris blooms in May.

Spring flowering bulbs are also used to provide masses of color, especially when they are planted in beds. This practice has given rise to the term, spring bedding, which may be defined as the temporary use of spring flowering plants which are massed for showy and striking effects. Other plants, such as English daisies, pansies, and forget-me-nots, are used in this style of planting, but the bulbs predominate. Masses of one variety or the planting of one variety with an edging or border of a contrasting variety, the working out of a design or figure, using different colors of the same group of bulbs or different kinds of bulbs—all these are examples of spring bedding. The author has read of a design for a Union Jack flag which was planted out in a large public park, using tulips, English daisies, and pansies to provide the proper colors. He has seen a circular bed in which the single early yellow tulip Chrysolora was used for the center, the outer rows of the early single white tulip White Hawk, and the edging of grape hyacinth Heavenly Blue. Numerous other examples might be cited.

This style of planting—the bedding style—is frequently seen on private estates, in public parks, cemeteries, and, to be regretted, sometimes on small home grounds. Hundreds of thousands of people enjoy the displays of color in tulips that are so frequently provided in public gardens or parks of the cities. Many people plant similar beds—on a smaller scale of course—on their front lawns; as already stated, it is to be regretted that such is the case. A tulip bed, four feet in diameter, placed in the center of a lawn possibly twenty feet square on either side of the front walk, is not in an ideal location. If one wishes to have such a bed, it should be located preferably at the rear or at the side of the house where it should fit much better into the general plan of the grounds. In many instances city lots have a frontage of fifty feet, which does not allow space for flowers on either side of the residence; under such conditions the garden must be in the rear and in that case the bed may be used as the central feature of the garden.

When such beds are planted, it is necessary to follow the bulbs with other kinds of plants to provide attractiveness during the remainder of the season. Geraniums, heliotropes, petunias, China asters or some kind of annual, are

Narcissi being grown for bulb production in a Massachusetts backyard garden.

Narcissus and Crocus in an indoor bulb show; background of pussywillow and Forsythia. Grass in the foreground was grown in a thin layer of soil on burlap.

frequently used, also, the all too popular castor bean and the canna. The latter two belong in the small front lawn just as much as cabbages and cauliflower belong in the flower garden.

Pansies, English daisies, moss pink (*Phlox subulata*), blue phlox (*Phlox divaricata*), and varieties of the tufted pansies (*Viola cornuta*), are sometimes used as underplantings or ground covers with bulbs of various kinds, especially Darwin tulips. Pleasing effects may be obtained in this way if color combinations are carefully considered.

Probably, however, there are more people who grow their bulbs in herbaceous borders and gardens rather than in beds. For the average home place unquestionably this is the best location. Groups of bulbs among perennials, such as columbines, peonies, phlox, delphinium, and numerous others will bloom before these plants have made enough growth to shade the bulbs, and if well spaced and planted and given proper culture, they should prove successful for many years. Sufficient bulbs of one kind should be planted in a group so that a mass effect is obtained rather than a "dotted effect". A colony of two dozen early tulip Goldfinch with twenty-five grape hyacinth Heavenly Blue is far more satisfying than the same number of bulbs scattered through

twenty-five feet of border. Groups of a smaller number of bulbs are easily within the capacity of any garden lover's pocketbook, so that any home flower border need not be without early spring flowers.

For those who are able to maintain gardens on an extensive scale, gardens of bulbs offer delightful possibilities for spring effects. Such gardens are attractive for a few weeks only, unless the bulbs are followed by summer flowering plants of various kinds such as are mentioned in connection with bedding. Beautiful gardens of this type may be seen at the larger flower shows, some of which gardens could be copied outdoors; others are idealized; "beauty alone is their excuse for being."

To a person who is fortunate enough to own a rock garden (not a rockery) spring flowering bulbs offer excellent material. The scillas, the glory-of-the-snow, the crocus, the snowdrops, some of the narcissi,—yes, and even tulips—may fit well into the scheme of the rock garden. They bloom at a season when there is usually plenty of moisture in the soil and are not injured by the dry conditions which may prevail in the garden during the summer.

Another use of bulbs which is very popular at present and gives very pleasing results is that which is known as "naturalizing". It

may be defined as the planting of bulbs in a natural manner in a natural location. A better definition might be the planting of bulbs in the grass, lawn, shrub border or other location in an attempt to imitate Nature. It is just the opposite of planting in the formal style in beds. When the proper location is available, the author believes that this use is better adapted to the grounds of the average home than is the bedding method. By the proper location is meant an area where the grass need not be cut early in the season with the lawn mower, thus giving the plant an opportunity to complete its growth, or a section in the shrub border or other part of the grounds where the bulbs may be allowed to grow undisturbed for several years. If planted in the lawn, the bulbs may bloom well the first season after planting, but with continued clipping of the grass the results become poorer from year to year. On the other hand, the author recalls an instance of a small private estate where narcissi were naturalized along the margin of a brook which flowed through a meadow; the effect from the residence was very pleasing, the grass was not cut until it was ready for curing as hay, consequently the bulbs had time in which to complete their growth. Another instance which comes to

mind is that of a small home place where narcissi were naturalized among ferns growing under a Red Astrachan apple tree; the bulbs bloomed before they were shaded either by the ferns or by the tree foliage. Scillas and chionodoxas produce very pleasing effects when naturalized along the margin of a shrub border. Crocus may be used in the same way and in addition seem extremely natural when blooming in the grass.

Finally, the narcissi and tulips provide excellent material for use as cut-flowers. In general the other spring flowering bulbs are too short stemmed to make them satisfactory for this purpose. If many flowers are desired for cutting, it is preferable to plant the bulbs in rows in some part of the garden where they can be left from year to year and in a location where they will not interfere with the preparation of the garden in the spring. Possibly they can be planted near the perennial vegetables. Without doubt many persons depend on the bulbs in their gardens or borders for such cut-flowers as they wish. However, if flowers of various kinds are wanted for use in the home through the season, a cut-flower garden should be maintained. The bulbs would then be properly located in this garden.

II

SOURCES AND SUPPLIES OF BULBS

THE production of bulbs for commercial purposes has been an important industry for years in certain European countries. Without doubt more bulbs are grown in Holland than in any other one country, but not all Holland is a bulb garden as one might be led to believe; there are only certain parts of the country where soil and climatic conditions in particular are satisfactory for bulb production and in these parts certain locations are preferable for narcissi, others for tulips, and others for hyacinths, these three being the most important groups.

Some kinds of bulbs are grown in France, probably more narcissi than anything else, with the Paper White narcissus, so commonly grown in pebbles and water, at the head of the list. Bulbs are also grown on some of the Channel Islands; for example, on the Island of Guernsey are produced the Golden Spur narcissi which are so strongly desired by com-

mercial florists for early forcing. From the Scilly Islands come some of the stocks of the narcissus Soleil d'Or where this variety is grown on a large scale for the production of cut-flowers. Lilies are grown in large quantities in Japan, which country alone supplies the greatest number of lily bulbs that are used in the United States. Bulbs of the Madonna Lily are at present obtained chiefly from northern France. Many of the so-called small spring flowering bulbs come from Holland.

Although bulbs have been grown in American gardens from early Colonial times, it is only in rather recent years that the commercial production of hardy spring flowering bulbs has become of any great importance. Many years before the days of Plant Quarantine 37 there were a few men who were growing bulbs on a small scale, among them Purdy of California, Smith, Gibbs, and Lawler in Washington State, Sheldon and Umpleby in New York State. Since 1908 the Bureau of Plant Industry of the United States Department of Agriculture has been carrying on bulb growing experiments at its station in Bellingham, Washington, and elsewhere; several bulletins describing this work have been published. But when Plant Quarantine 37 of the Federal Horticultural Board went into effect in 1919,

limiting the general importation of bulbs to six kinds (narcissi, tulips, hyacinths, crocus, lilies, and lily-of-the-valley), with certain restrictions, bulb growing in this country was given a decided impetus. Again, in 1922, when the above mentioned Board modified its former ruling by permitting the entry of several additional minor bulbs for a limited time, but at the same time stating that narcissi would be put on the excluded list not later than January 1, 1926, the industry was given another push. This is indicated by the fact that in the Fall of 1926 some 42,000,000 narcissus bulbs were imported for propagation purposes. The Department of Agriculture therefore considers that the commoner narcissus varieties are now available in the United States in quantities sufficient for propagation needs. It has ruled that for the year beginning July 1, 1927, importations will be restricted to limited quantities of new varieties and other varieties that are not now available for propagation in this country.

One point which is commonly misunderstood in regard to Plant Quarantine 37 should be made clear; the quarantine regulations do not absolutely bar out any kind of bulb; new varieties and forms not available in sufficient quantity for propagation purposes may be

imported under prescribed conditions, be it crocus, narcissus, freesia, gladiolus, or any other variety.

The possibilities of bulb production in this country can perhaps be best explained by the following quotations. Charles Willis Ward of Queens, New York, and Eureka, California, who endeavored to produce many plants in California that previously had been obtained from European countries and who practically sacrificed his life in this pioneering work, made the following statement in 1918: "Take the question of hyacinth, tulip, narcissus and other bulbs, commonly known as Dutch bulbs, there are millions of these bulbs now growing along the Pacific coast at various points from Santa Cruz northward to Vancouver, B. C., and in the vicinity of Norfolk, Virginia. Here again may be found localities where the climatic and soil conditions are far superior to the conditions in which these bulbs are grown in any part of Europe. In Holland, in spite of the conditions that are decidedly unfavorable to the growth of these bulbs when compared with the conditions in the Pacific coast bulb districts, the Hollanders have, through sheer devotion to their business, stubbornly and laboriously given the culture of these bulbs their undivided attention and also, through shrewd

ability to advertise and sell their goods, enjoyed a practical monopoly of what is known as Dutch bulb growing, simply because no one else in any other part of the world has thought it worth while to delve deeply into commercial bulb culture and give it the necessary attention to make a success of it."

Dr. David Griffiths, bulb expert of the Bureau of Plant Industry of the United States Department of Agriculture, makes the following statement in Bulletin 797 (1919), "Commercial Dutch-Bulb Culture in the United States": "The production of bulbs in the United States is in its infancy. In normal times the value of bulbs used in this country is not far from $2,000,000 a year, while those actually produced here are scarcely worth $25,000 in any one year. This condition exists in spite of the fact that it has been known for generations that narcissus bulbs of perfect quality can be grown over a wide latitude and that tulips, although more exacting in their requirements, can also be produced successfully. The best informed are just as sanguine about the production of hyacinth bulbs, but, true to their scientific training, they are inclined to withhold advice and judgment because, so far as is known, no actual demonstration has yet been successfully accomplished

on a scale large enough to command respect. The reason for this can be summed up in the phrase 'We have thought that all of these stocks could be bought cheaper than we could grow them.' Whatever may be the truth regarding this prevalent opinion, whatever may have been the facts in the past, it is very certain that in the future the conditions are going to be different."

Speaking of tulips, Dr. Griffiths says in Bulletin 1082 (1922) of the Department of Agriculture, "The Production of Tulip Bulbs": "There is no limit to the quantity of bulbs which it is possible to produce in the United States. We have climates that are unexcelled for the production of these stocks. We have regions with an abundant moisture supply from October to June, and we have dry summers. We have fertile sands, inexhaustible loams, and deep friable silts, upon all of which tulips can be grown."

Hardy narcissi are being grown in many states in various parts of the country, from Massachusetts to California and from Michigan to Texas. The tender types, such as the Paper White and Soleil d'Or, are naturally being grown more in the South and in California. Whether the supply will meet the demand in the next few years is a question; at

present it is certain that the supply is not sufficient, but in time, with knowledge of proper methods of culture for certain varieties and of the proper location in the country for the growth of certain varieties, production should increase rapidly. The author believes that the latter is one of the most important factors concerning which information is needed; for example, some day it will be known where the best Paper Whites can be grown, where the best King Alfreds are produced, and where the finest Poeticus Thelma can be obtained.

Tulips, probably the next to come under the ban of plant quarantines, are being grown by various concerns, most extensively in the Northwest. Dutch grown tulips are yet available in great quantities at moderate and low prices. Apparently very few American grown hyacinths and other flowering bulbs are available or will be available in quantity for several years at least; supplies of such bulbs must come from across the water. *Lilium regale,* the Regal Lily, an extremely desirable type, is being grown from seed with excellent results; it is not cheap in price as yet, but naturally it will become less expensive as the supply of bulbs becomes greater. Although it is not pure white like the Madonna Lily, the author

*TABLE I.—Mechanical analyses of soils used for growing bulbs on the Island of Guernsey, in The Netherlands, and at the United States Bulb Garden at Bellingham, Washington.

(Size of particles in millimeters.)

LOCALITY	Fine gravel 2-1 mm.	Coarse sand 1-0.5 mm.	Medium sand 0.5-0.25 mm.	Fine sand 0.25-0.1 mm.	Very fine sand 0.1-0.05 mm.	Silt 0.05-0.005 mm.	Clay 0.005-0. mm.
Island of Guernsey.....	5.6	7.8	4.8	12.1	15.8	38.3	15.5
Netherland best type	.0	.4	19.5	78.5	.7	.6	.4
Netherlands average type	.3	.6	10.3	76.7	2.5	5.5	4.0
Bellingham silt loam	.3	1.3	.4	2.7	8.3	68.7	18.1
†Podunk silt loam	.09	.3	1.11	9.95	52.47	31.29	4.

*U. S. D. A. Dep't Bulletin 28. 1913.
†U. S. D. A. Yearbook. 1894.

ventures to state that some day it will be the most popular of the white hardy lilies. Other species of lilies are being grown from seed, both by amateurs and commercial growers. Narcissi are also being grown from seed for the purpose of obtaining new varieties; patience is necessary for such work since it may require a period of seven years or more before the first flowers are obtained. However, a race of American grown seedlings, produced under and adapted to American conditions, may prove of great value to commercial growers.

To anyone who is contemplating the production of bulbs, the table of soil analyses on page 26 may be of interest and value.

The Podunk silt loam is the typical onion soil of the Connecticut Valley where a few experiments in bulb production have been or are being maintained, apparently with good results.

Factors other than soil must be considered in locating fields for commercial bulb production, more especially temperature, (winter and summer), rainfall, atmospheric moisture, and fertility requirements. Anyone who is particularly interested in this subject should obtain the various publications of the United States Department of Agriculture.

III

BULB STRUCTURE AND ITS RELATION TO BULB CULTURE

THERE are a few points concerning bulbs and their structure which should be of interest and importance to amateurs as well as to professional gardeners. The first of these is the question as to what constitutes a bulb. It may be defined as an underground structure, composed of a bud (the new plant in a miniature form), surrounded by scales which are modified leaves. In the fall of the year, when certain bulbs are well matured, this miniature plant may readily be seen if a bulb is cut in halves vertically. For example, if a hyacinth bulb is well ripened, it is frequently possible to count the number of "bells" or individual florets which would have been produced on the flower spike; with a tulip it is a fairly simple matter to count the number of stamens.

On the other hand, if the bulbs have not yet reached the flowering age, the miniature plant will show leaves only. Thus it becomes evi-

dent that to secure flowers from bulbs the first season, the flower buds must be present in the bulbs when they are purchased. Paper White narcissi, of small size and purchased at low prices, will sometimes fail to bloom in the home, not because the flower buds failed to develop properly, but because they were not present in the bulbs at the time of purchase.

As stated previously, the bud or plant in embryo is surrounded by the bulb scales which fulfill two functions, protection and food storage,—protection of the bud during its dormant period in the ground, in the storage room, or on the counter in the retail store, and storage of food utilized by the plant before it has developed a root system and is able to obtain food from the soil. Paper White narcissi are easily grown in pebbles and water because the period of growth before blooming is comparatively short, and because the food in the bulb, plus water, light, and heat will produce flowers if the buds are present in the bulb. On the other hand tulips, which have a longer period of growth, do not give as satisfactory results under the same conditions, although it is possible to grow them in this manner.

The character of the scales varies greatly in the different groups of bulbs. For example, the hyacinth and the narcissus are composed

of numerous, closely overlapping, concentric scales, (similar to the onion), the tulip consists of a few rather dry and fleshy scales, while the common type of lily bulb is composed of loose, overlapping scales. Those in the first group are known as tunicated bulbs, the last as scaly bulbs. Such differences in structure indicate differences in handling and treatment. American grown narcissi are being shipped by some growers in coarse woven sacks (similar to those used for onions) or in ordinary grain sacks. Lilies, shipped in this manner, would be broken in many pieces and would be worthless, whereas apparently no injury is done to the narcissi. Tulips properly protected by their tough outer scales might endure such rough treatment but undoubtedly many of the scales would be broken and would fall from the bulbs; they will grow when these "husks" have been removed or when they have fallen from the bulb due to breaking, but it is preferable that Nature's method of protection should be allowed to fulfill its purpose.

Bulbs composed of loose, overlapping scales should not be exposed to the air for any great length of time after they have been received from the dealer. If it is not possible or desirable to plant them immediately for one reason or another, such bulbs should be stored in dry

sawdust or shavings, or in dry sand or soil. Tulips, hyacinths, narcissi, and various other bulbs may be kept unburied in a cool, dry room without danger of serious injury.

It is evident that the definition of a bulb given previously does not include the corm which may be defined as a thickened underground stem from which arise leaves and flowers. When such a corm is halved vertically, it is found to be a solid structure, not composed of overlapping scales. The presence of the flower buds is not evident to the naked eye unless the buds on the surface are sufficiently developed. The crocus is the most familiar of all the spring flowering plants having this type of structure; the gladiolus, the source of wonderful color in the summer and early fall, is another example. Botanically speaking, both are cormous plants, but popularly speaking they may just as well be called bulbous plants. A gla-di-ó-lus and a gla-dí-o-lus are one and the same; the corm, to all popular intents and purposes, is a bulb; "a rose by any other name would smell as sweet."

A fact not always understood, a principle not always followed by amateur gardeners, is that a bulbous plant must be allowed to produce and mature its foliage if the plant is expected to put forth flowers annually over an

indefinite period of years. The plant does take up a certain amount of food from the soil, nitrogen, phosphorus, and potassium especially, but in the leaves it "manufactures" or elaborates the various food materials, which are then carried to the bulbs and stored up for use by the plant during its next growing season. Is it then to be wondered at that the crocus gradually disappear from a lawn when the lawn mower is put into operation just as soon as the flowers are past their prime? Unlike some of the spring flowering bulbs the crocus make their greatest amount of leaf growth after the flowering period; therefore, if they are to be planted in the grass, a location should be selected where it will make no difference if the grass does get rather tall before it is cut. This principle also holds true for narcissi and other bulbs which may be used for naturalizing purposes. Many of the narcissi produce so much foliage that a few leaves may be removed for use with cut-flowers without danger of injury to the bulbs. With tulips at least one large leaf should be left to carry on the vital functions of the plant. In all cases bulbs which are most likely to suffer by removal of leaves are those which are naturalized in the lawn.

(Upper) Double flowered Poet's Narcissus blooming freely in a perennial border.

(Lower) Native ferns make an attractive setting for a group of Narcissus Emperor.

Narcissi and ferns always make pleasing combinations in a natural style of planting.

IV

PLANTING, CARE AND CULTURE

THERE are three facts, of general application to all kinds of spring flowering bulbs, which should be brought to mind in connection with the subject of planting. The first is that it is desirable to place the bulb order early. One advantage of this practice is that many dealers allow a discount from their regular prices if the bulbs are ordered in the summer before their final orders are placed with the foreign growers. It may be interesting to note that occasionally garden clubs and similar organizations pool their orders and thereby obtain a substantial discount from prices that would prevail for small individual orders; in such cases the order may be sent direct to the foreign grower. Another fact, which is equally if not more important, is that the purchaser is more likely to receive the specific varieties which he wishes; in filling "eleventh hour" orders it is not always possible to supply the varieties desired; they must be omitted or sub-

stitutions made which will not always prove satisfactory. A third advantage is that large retail orders may be sent direct to the foreign grower who will make up the order, thus doing away with counting out and packing on the part of the dealer.

Again it is generally preferable to order bulbs by variety name rather than by color. For example, it is better to specify a hundred bulbs of the Darwin tulip Clara Butt and fifty grape hyacinths Heavenly Blue rather than to ask for a hundred pink Darwin tulips and fifty blue grape hyacinths. Not only is there much satisfaction in knowing the names of the varieties used in the garden or border, but such varieties are usually better than unnamed sorts. However, it must not be taken for granted that a variety is good just because it has been given a name. Bertrand H. Farr, the noted iris and peony enthusiast, once said that somebody at one time must have thought that any given variety of iris was beautiful, otherwise it never would have been named or put upon the market. The same thing, with just as much truth, might have been said of tulips, hyacinths, narcissi or any other bulbs, but fortunately or unfortunately, depending on one's point of view, not all persons have the same ideas of beauty. The opportunities at

present for obtaining varietal names are so numerous and the lists given in many catalogs are so reliable that it is not a difficult task to make selections, except in knowing when to stop.

And remember that it pays to buy bulbs of good quality. As with plants grown from seed, it requires no more labor or fertilizers to grow good bulbs than poor ones, and the results in the former case are more satisfactory. Unfortunately many home gardeners order their bulbs by mail so that it is not possible for them to see their bulbs before purchasing; they must depend upon the reliability of the dealer. Qualities desired are firmness, maturity, and freedom from insect pests and diseases. Lack of firmness, a soft flabby condition, may be due to poor cultural practices or to unfavorable seasonal conditions, but is more likely to have been caused by continued exposure to the air in a warm temperature after digging. Most bulbs, if well matured at the time for planting, will show the embryo plant well developed, as explained in Chapter III. However, it is not necessary to cut a bulb in halves in order to show its degree of maturity; an immature tulip appears greenish under the brown scales, while a well ripened and properly cured bulb will show white flesh. On hyacinths and nar-

cissi the outer scale coverings should be well ripened; on the latter they will be more or less papery in character.

The question of freedom from insect pests and diseases should also be considered in buying bulbs, especially if one has an opportunity to examine the bulbs before making the purchase. Fortunately the number of insect pests that are likely to be found are not as yet very numerous in the bulbs that are offered to the retail trade. Certain pests may be found in narcissus bulbs but the other kinds are comparatively free. Diseases are more prevalent; the botrytis blight is frequently found on tulips, fungus causing decay is often found on crocus bulbs, and others might be mentioned. These subjects are discussed in Chapter IX.

It should be remembered that a high price is not necessarily a criterion of value and beauty. A high price usually means that the variety is new or rare and consequently is not available in large quantities or that it is an older variety which does not multiply rapidly. For example, a tulip which retails at fifty cents per dozen may be of as great garden value, with regard to color, as a variety which sells for twenty times as much. The fanciers and the specialists will buy the expensive varieties;

the average gardener may better buy the varieties that are within his means.

Methods of planting, care, and culture of the hardy spring flowering bulbs are so similar, so far as their use in the home garden is concerned, that these practices can be discussed in a general manner, with specific applications when necessary. If one were to undertake the production of bulbs on a commercial scale, it would unquestionably be desirable to consider the various groups separately.

An unenlightened person, viewing a beautiful bed of Darwin tulips in full bloom in late May, innocently inquired if the bulbs were planted that same spring. He was not aware that such bulbs and the others which have been mentioned in previous chapters are practically always planted in the fall; spring planting might be resorted to if the bulbs were not received early enough for fall planting and if they could be held in dormant condition in storage over winter. The exact time when the bulbs should be gotten into the ground is governed to a great extent by the time when the bulbs are received, either from American or foreign growers. In general, it may be said that it is safe to plant bulbs from late September to late October or early November, the last depending upon the season. The writer

has heard of a busy country doctor who planted his bulbs so late that it was necessary to use a crowbar to get through the frost in the ground, but this type of planting cannot be recommended for general practice. If crocus can be obtained early, they should be planted early, (late September), since top growth will make a decided start if the bulbs (botanically corms) are kept in storage for a long period. The grape hyacinth (*Muscari*) also has this habit of making considerable top growth before it is gotten into the ground unless planted early. Narcissi and hyacinths should preferably be planted in the earlier part of October so they also will have an opportunity to make strong root development before the ground becomes well frozen. Tulips may be planted later with apparently satisfactory results, but with earlier planting they will doubtless produce flowers of better quality on longer stems. Extremely late planting is not desirable in any case; the bulbs do not have an opportunity to make roots before the ground freezes, and in the spring top growth begins without the supporting root systems; consequently the flowers are small and short stemmed. If it is necessary to plant late, frost may be kept out of the ground by mulching the bed or space in the border heavily with

leaves, hay or straw; this gives the bulbs a chance to make at least a few roots before extremely cold weather arrives.

The soil in which bulbs are to be grown should be thoroughly prepared, a phrase which is so commonly used that it has become somewhat trite. With regard to spring flowering bulbs it means that the soil should be spaded up to a depth of nine inches at least; for large bulbs which require deeper planting, a depth of twelve inches would be better. When beds have been used for bedding plants during the summer, such plants should be removed, the soil worked over again and bonemeal thoroughly mixed in at the rate of one pound to twenty or twenty-five square feet of surface, depending on the degree of fertility of the soil. On heavy clay soils the addition of leafmold (sand when the former is not available), will assist greatly in improving the physical condition by making such soils more open; light sandy soils are benefited by the application of leafmold since it makes them more retentive of moisture. If animal manures are used, they should be in an extremely well rotted condition so that there will be no danger of injury to the bulbs or their roots by the fermenting or heating action of the manure. Some authorities go so far as to say that manure should

never be used with bulbs, even in a well rotted condition. The writer believes that this is rather extreme; in a thoroughly decayed condition and well mixed with the soil it should not prove injurious; doubtless at this stage it will have lost some of its meager amount of plant food, but it will at least add organic matter to the soil and thereby improve the soil texture. If manures were so decidedly harmful, long ago the Dutch growers would have ruined their bulb plantations by their system of fertilization. Manure applied in the spring when the bedding plants are set out and bonemeal in the fall should usually prove satisfactory.

There are two common methods of planting bulbs in beds which, for lack of better names, may be called the "surface spaced" and the "excavated" methods. In the first the soil is properly prepared, the surface is levelled or slightly crowned, and the bulbs are placed on the surface at the desired distances apart. Then with a trowel, bulb dibble, or the hand, a hole is made, the bulb dropped in and covered. The second method consists of preparing the soil, excavating it to the proper depth for the specific type of bulb, and placing the bulbs in position; the soil is then put back carefully so that the bulbs will not be tipped

over. While the first practice is much more economical of time, the second ensures uniform depth of planting and accurate spacing of bulbs, which is desirable if a complicated design is being worked out.

Depths and distances apart for planting various bulbs are shown on the accompanying chart which is frequently seen in bulb catalogs and other publications. It should be noted that in all cases the depth is from the top of the bulb to the surface of the soil. The distances given between bulbs should be considered as the minimum; it may frequently be desirable to allow more space, especially with Darwin tulips, first size hyacinths, and large narcissus bulbs.

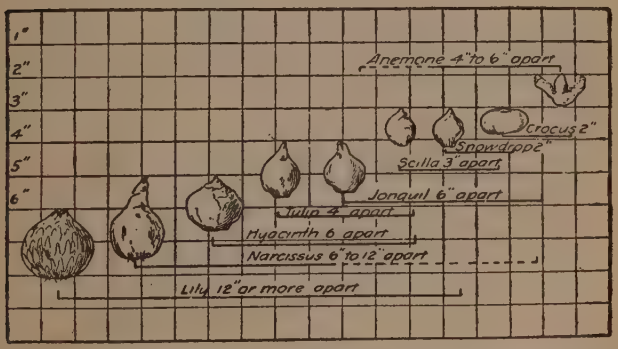

Diagram showing depth and distance apart for planting certain bulbs. Some lilies should be set at greater depths.

It is a simple matter to determine the number of bulbs required for an area of definite size. For example, assume that it is desired to plant a bed eight feet long and three feet wide with hyacinths spaced six inches apart each way; the area of the bed is 24 square feet or 3,456 square inches; the space allotted to each bulb is 36 square inches; dividing the former by the latter it is found that the bed will require 96 bulbs. If a circular bed is to be planted, it is essential to know that the area of a circle is obtained by the formula πr^2, in which π is 3.1416, and r is the radius of the circle. Assume that hyacinths spaced six inches apart in each direction are to be used in a bed six feet in diameter; the area of the bed will be 3.1416×3^2 or 28.2744 square feet or 4,071.5136 square inches. Dividing this area by the space for one bulb, 36 square inches, it is found that 114 bulbs will be required.

In border planting, where other perennials are already established and bulbs are to be used among them, the soil should be prepared in a manner similar to that already described. Bulbs may be spaced at greater intervals than shown on the chart, since the presence of foliage on other perennials does not make the

bulbs appear as sparse as they seem when they are planted at greater distances in beds.

The proper choice of location is doubtless the most important factor in the naturalizing of bulbs. As already stated, it is essential that a spot should be selected where it will not be necessary to cut the grass early in the season, the reasons for which have been discussed in Chapter III. The next important factor is to obtain a natural arrangement of the bulbs. People laugh frequently at the idea of putting bulbs in a flat basket, throwing them in the air and planting them where they fall, yet this will give a decidedly natural grouping; some will fall near together, giving the central effect of the colony, others will lie farther apart, and others will scatter widely, just as though they were going to start a new colony, the whole conveying the idea of a planting which has spread by natural seeding. When large quantities of bulbs are to be naturalized they can be scattered about by handfuls and planted where they fall. It is a difficult matter to place the bulbs one by one and obtain the desired effect; the planting becomes more or less geometrical and is neither formal nor natural in character. In actual planting the hole is made to the desired depth with a trowel, the soil is loosened up in the bottom of the hole

and the bulb placed in the proper position. Instead of replacing the turf, it is better to cover the bulb with good garden soil; the appearance for the first season may be a little unsightly, but the grass will soon cover the bare spots. Such plantings can be left to take care of themselves for years, until the bulbs become so crowded that they fail to produce flowers; it will then be time to lift, divide, and replant them.

The next question which arises is how the bulbs are to be cared for over winter. It is desirable that bulb plantings should be mulched over winter, although such a practice may not be absolutely necessary. In the first place it should be remembered that a mulch is to hold the frost in the ground, not to keep it out; it is not actual freezing that in many instances causes injury to bulbs; the injury comes as a result of alternate freezing and thawing that occurs in open winters. Therefore, it becomes evident that early mulching is not desirable. A second reason for waiting until late is that it is a good plan, if possible, to let the field mice make their winter homes elsewhere than in the mulch; they are likely to do this if the bulbs are not covered until the ground is well frozen. If the ground freezes in early December and is

soon covered with snow and remains covered until spring, bulbs and various perennials should come through in fine condition; it has been said truly that snow is the poor man's fertilizer. Various materials may be used for mulching, straw, strawy manure, marsh hay, leaves, or evergreen branches; leaves are probably most commonly available, but straw or evergreen boughs which do not compact closely would be nearer the ideal.

It is difficult to say just when the mulch should be removed in the spring, so much depends upon seasonal conditions; some years it might be necessary to remove at least part of the material in March, another year it might not be until April. If the snow goes early and the bulbs are found upon examination to be coming through the soil, it will be desirable to uncover them before the growth becomes stunted or malformed. Under such conditions some evergreen boughs or a covering of light burlap would prove useful for protection on cold nights. Most of the spring flowering bulbs will endure frost without showing injury, but if hard freezes come, it will be desirable to make use of cold water and the sprinkling can to help draw the frost out of the plants.

While it is not absolutely essential, cultiva-

tion of the soil in the spring will improve the appearance of the bulb bed or section of the border and the loose soil, acting as a mulch, will aid in retaining moisture in the soil. Acid phosphate, applied at the time of cultivation at the rate of two to four ounces per square yard will prove beneficial when bonemeal has not been used the previous fall. During the growing period bulbs require practically no attention, one reason why they are so especially satisfactory; usually there is sufficient moisture in the soil for the needs of the plants so that it is not necessary to get out the garden hose; also, weeds are easily kept in check. After the flowers have faded it is desirable to remove them; seed production may not be decidedly injurious to the bulb, but there is no necessity of using the energy of the plant in this vital process when the seed is not to be sown. Tulip flowers should be broken or cut off above the top leaf; narcissus flowers may be pulled out; if cut, they should be cut fairly low, where the stem is solid, not near the top where it is hollow and consequently would allow moisture to sink down into the bulb. Hyacinth spikes may either be cut or pulled out. Grape hyacinths mature seed readily and propagate rather freely by self-sowing. With the others it is merely a question of removing

dead flowers to prevent seed formation or to improve appearances.

A question which very frequently arises is what shall be done with the bulbs during the summer. In the naturalized planting or in the border the question is practically settled, since such bulbs are left to take care of themselves until they get so thick that they fail to bloom, when it is time to lift, divide, and replant them, or until they are choked out by the grass. If a formal design is planted in a bed, or if it is desired to maintain a mass of one color, it is preferable to plant new bulbs every fall; after the first season blanks will occur where a bulb of flowering size has not developed or where the parent bulb has split up into several smaller bulbs. Those that are removed need not be discarded; they can be planted in the herbaceous border, in the cut-flower garden, or naturalized, with the exception of tulips and hyacinths. They may be removed soon after flowering and "heeled in" in an out-of-the-way location if summer bedding plants are to be used in the same location; a trench about six inches deep is dug with one straight side and one sloping side; the plants are laid down and covered with soil, a second layer added and covered, and continued thus until all are buried. When the bulbs

have ripened thoroughly, as indicated by the yellowing and decaying of the foliage, they may be removed and kept in a cool, dry place until planting time comes around again. The writer knows of instances where bulbs have been dug up in full leaf, tulips especially, and kept in a barn in boxes of soil during the summer and early fall.

When the bulbs are left in the ground, either in the bed or in a border, annuals may be used to cover the ground and provide color during the summer months; this is especially true of the larger bulbs such as tulips, hyacinths and narcissi. It will be preferable to start the annuals in the hotbed or coldframe and transplant them once before putting them in among the bulbs. Seeds sown directly in such beds are not always satisfactory because of the amount of shade cast by the bulbous plants. Although they are not strictly annuals, pansies, forget-me-nots, English daisies and phlox make desirable underplantings for bulbs and with thoughtful regard for colors, may provide pleasing combinations, such as narcissus Victoria and pansy Emperor William, Darwin tulip Rev. Ewbank, and English daisy Longfellow, poet's narcissi and forget-me-nots, Darwin tulip Baronne de la Tonnaye and *Phlox divaricata laphami.*

A bulb garden in Holland. What a feast of color! *(Courtesy of Cranfield & Clarke).*

May-flowering Picotee Tulips (white edged with rose) are always graceful and effective in the herbaceous border.

The frequency with which bulbs in permanent plantings must be dug up, divided, and replanted depends on the rate of increase. It is therefore impossible to give any hard and fast rule. When they become so thick that leaves only are produced, it is evident that they need replanting. Such work may be done in the fall at the proper time for planting bulbs or the bulbs may be dug in the summer after ripening, and set out in the fall. An alternative method is to dig them after flowering and replant immediately, leaving all foliage to assist in manufacturing food. An example may be cited of a clump of double white poet's narcissus (*N. albus plenus odoratus*) which had been allowed to grow without attention in the grass. In a certain season the clump produced one flower; in July of that same year it was divided and replanted, approximately twenty-five bulbs being found; twenty flowers were obtained the following year, results which have continued through the past season.

Other points in regard to culture, such as diseases and insect pests, failure to bloom, and blasting of flower buds, are discussed in Chapter IX.

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V

THE TULIP

Some writer has said: "The tulip is an Oriental plant and we perceive Eastern splendor in the brilliancy of its flowers. The remarkable rich and glowing colors, the large size and massive substance of the floral urns, the dusky sheen of some varieties, the metallic sparkle of others, have a truly Oriental magnificence." In no other group of spring flowering bulbs is there found such a variety of color as occurs in the tulip, ranging from the purest white through numerous intermediate tones to red, crimson, violet, scarlet, orange, and yellow. When tones of blue are desired in the spring months, they must be sought in other flowers, but the tulips provide almost every other tone that may be wished in the field of color. It gives us varieties which run from the purest white, such as Pelican, to the darkness of La Tulipe Noire and Philippe de Commines, from the clear pink of Clara Butt to the brilliant rosy-scarlet of Farncombe Sanders, from

the soft yellow of Moonlight to the metallic lustre of Louis XIV, and from the striking variegation of Roi des Cerises to the gentle harmonizing of tones in John Ruskin. But there is no end of color when one is considering tulips; the only flower which can in any way compare with them in color is the gladiolus, but even it must take second place.

If color alone were not sufficient reason for growing tulips, they have other good qualities which recommend them strongly—the season of bloom which may extend over a period of several weeks with the proper selection of species and varieties, usually a strong, sturdy stem which makes the flower admirable for decorative purposes, (when placed in satisfactory containers), and for use in cut-flower competitions. Comparatively low prices put the bulbs within the limits of everyone's purse so that the tulip is not a flower for rich men's gardens only. Of course if one wishes to become a fancier or an enthusiast, he or she may pay high prices for new and rare varieties; for example, there is the new yellow-flowered Darwin variety, "Capt. Charles A. Lindbergh," listed by one of the Dutch growers at six dollars per bulb. On the other hand, there are many of the Darwin varieties, a gross of

which could be purchased for the price of one bulb of the previously mentioned variety.

The tulip is a member of the lily family, (*Liliaceae*) which includes several other groups of spring flowering bulbs, the true lilies, the Hostas or plaintain lilies, the Hemerocallis or daylilies, and various other common garden and greenhouse flowers. The botanical name *Tulipa* had its origin in the Persian word, dulban, toliban or thoulyban, a turban; in the Turkish language the name is dulbend or tulbend, also meaning a turban. Unlike many of our garden flowers, it is easy in this case to see why the name was given, since the flowers of many varieties, when inverted, bear a close resemblance to this Oriental type of headdress.

Sometimes the tulip is called "the flower that set a nation mad" because of the "tulipomania" or tulip craze, which it brought about in Holland. The story of the craze, which is rather interesting, may be summarized briefly. As early as 1591 tulips growing in the garden of Carolus Clusius, a botanist, stimulated interest greatly in this group of plants. Since he was unwilling to sell bulbs, even at extravagant prices, the neighbors of Clusius stole them from his garden. Bulbs then having been imported from other countries, Clusius was unable to prove what were his own var-

ieties. Trading in bulbs increased rapidly; without doubt this trading was at first legitimate, but as time went on, it developed into pure speculation, reaching its height in the period from 1634 to 1637. It was only a form of gambling; admiration of the flower and interest in its culture were of minor importance. Loudon says: "The gaudy tulip drove the Dutchman as wild as ever did the South Sea bubble or the senseless speculations that took possession of our countrymen a few years ago, the gullible John Bull." Ownership of bulbs was divided into shares and many schemes known to the stock and bond market were in vogue, often without the existence of bulbs. At one time there were only two bulbs of the variety "Semper Augustus" in existence, one at Amsterdam and one at Haarlem; for one of these was offered the sum of four thousand six hundred florins, a new carriage, two gray horses, and a complete set of harness; another person offered twelve acres of land for the bulb. At a public auction near Amsterdam in 1637 one hundred and twenty bulbs were sold for ninety thousand guilders (about $41,000); later one of these bulbs with its offsets sold for five thousand two hundred guilders (about $2,400). Such fabulous prices would seem to indicate the existence of tulip

fanciers rather than a form of gambling. Finally the government had to interfere and put a stop to these practices, but not until many families had been ruined or impoverished financially. In 1637 "t' Samenspraecken" was printed at Haarlem; the author is said to be unknown, but the publication, a conversation between two weavers, is supposed to be the chief source of information concerning the tulipomania. A second and enlarged edition was published in 1643 and a third edition appeared in 1734 as a warning against a hyacinth mania, of which there were symptoms at that time.

In connection with the tulip craze it may be of interest to mention the book "La Tulipe Noire" by Dumas, of which there are English translations. It provides an interesting story of the development and adventures of the black tulip, as well as a pleasing love story, if one can endure two chapters of murders and a near execution.

Garden Groups of Tulips

For the amateur undoubtedly a horticultural classification is more desirable than a botanical key, based on gross characters rather than on botanical details. Possibly the follow-

ing arrangement is more inclusive than that found in the average retail bulb catalog but the author trusts it will be of interest and value to the home gardener.

I. Early flowering tulips, blooming from early to mid May.

1. Duc Van Thol; very early; small flowers on short stems; few varieties. Example, Duc Van Thol Rose.
2. Pottebakker; larger flowers; stems usually pubescent (downy); few varieties; supposed to have been derived from *Tulipa pubescens*. Example, Pottebakker White.
3. Common; blooming about mid May; wide range of colors; numerous varieties; supposed to have been derived from *Tulipa suaveolens*.
   a. Single flowered. Example, DeWet.
   b. Double flowered. Example, Murillo.

II. Late flowering tulips; blooming from mid May to early June; supposed to have been derived from *Tulipa gesneriana* chiefly.

1. Breeder or Mother tulips.
   a. Rose.
   b. Bybloem } Rectified or broken types.
   c. Bizarre.
2. Darwin group.
   Rembrandt.
3. Parrot.

4. Double flowered.
5. May-flowering or Cottage.
6. Lily-flowered.
7. Mendel.

III. Species.

It is evident that more detailed descriptions are not needed for the early flowering types, but additional notes on the late flowering groups may be of interest to the reader. When tulips are grown from seed, it is said that the first flowers produced are of one or a "self" color (no variegations); they may hold this color for an indefinite period of years; these are known as "Breeders," many of which at present are bronze, brown, or orange colored forms, frequently with a wonderful metallic sheen. When the Breeders split or vary into combinations of colors, they are said to "break" or "rectify." The latter seems a peculiar term to use, since to rectify usually means to improve; according to our present standards flowers of one color are considered better than variegated types, but this shows how fashions change in flowers as well as in clothes. Some of the methods used years ago to induce breaking are amusing to say the least; the formula advocated by one gardener was as follows: "Take the plaster of old

walls, wherein is a great deal of lime, and powder it very fine; mix this with drift sand, or such sand as is sharp and found on the sea-shore; to this add of the water that runs from a dung-hill; mix these as well as possible and put over the surface of the bed a little before you plant your breeding or plain tulips, and 'twill make them break into fine stripes to a wonder, as is related to me by a gentleman of great honor, who has proved it, as he observes, for five or six years."

When the Breeders broke or rectified, they were classified according to the colors of the variegation: A. Rose type, base or ground white with markings of pink, rose, scarlet, cerise, crimson, and intermediate tones; B. Bybloem type (literally, second section), base or ground color white with markings of lilac, lavender, violet, and purple; C. Bizarre type (Bizard of the Dutch), base or ground color yellow with markings of various colors. Any of these forms may be (a) feathered, pencilled or marked around the edges of each petal, or (b) flamed, with strong and brilliant streaks, bands or flames of color shading up from the base of the petals.

The history of the Darwin tulip apparently runs as follows: from 1860 to 1872 a Flemish grower sowed seeds of some of the best

Breeder and broken types with the purpose of producing a fixed race of self-colored flowers which should differ from the types known at that time. The bulbs from which seeds were obtained formed one of the most famous collections in Flanders and had been in the possession of one family for over a century. About 1885 Krelage, an important Dutch bulb grower, purchased the entire collection and transferred it to his establishment near Haarlem; here he continued the process of selection, which had been in operation since 1860, and propagated the best sorts. They were put on the market in 1889 and were given the name "Darwin" in honor of Charles Darwin, the great apostle of the theory of evolution. They may be described as single flowered, late blooming, tall growing, self-colored varieties in all colors except blue. Until recently yellow was not included in the colors of Darwin tulips, but it has now been added to the group, as already mentioned, in the variety "Capt. Charles A. Lindbergh." It is also stated that a variety "Yellow Giant" has been obtained by crossing the Darwin "La Tulipe Noire" and the May-flowering variety "Bouton d'Or." Without doubt more varieties in this color will appear in the next few years so that yellow

flowered Darwins will be available at moderate prices.

In spite of all his work of selection, the Darwin varieties did not hold true to their colors, for in 1900 Krelage introduced the Rembrandt type, or broken Darwin, the name being suggestive of the artistic qualities of the flowers; at that time they were described as varieties having a pure white ground, with irregular markings, more or less blotched and flamed with heavy and rich colors, dazzling carmines, blacks, crimsons, pale mauves, soft roses, lilacs, intense amaranths, violets, and scarlets. Thus it will be seen that they are similar to Rose and Bybloem types, the difference being their source or origin.

The Parrot tulip is a botanical variety, *Tulipa gesneriana* variety *dracontia*. It derives its name from the fact that at a certain stage of development the flower resembles a parrot's neck. The flowers are characterized by their fringed petals, with colors in combinations of red, yellow, and green. Frequently the stems are so curved and weak that this group is not satisfactory for garden use.

Very few double flowered forms of the late flowering type are listed, either in Dutch or in American catalogs. One American retailer

lists three varieties, none of which is commonly seen.

The May-flowering or Cottage tulips compose a miscellaneous group which may be said to include late flowering forms which are not included in the other types. They are called Cottage tulips because so many of them were found in cottage gardens by growers who have since produced the bulbs commercially and made them available for general use.

The so-called Lily-flowered tulips will without doubt become more popular as a greater number of bulbs and a greater number of varieties become available. Due to the strong recurving or reflexing of the petals the flower bears some resemblance to the form of certain lilies. The type was obtained by Krelage by crossing *Tulipa retroflexa*, yellow with strongly recurved, narrow-tipped petals, and a Darwin variety. Siren, the first of the type, is yet the leading variety. In some catalogs varieties of this type are included with the May-flowering or Cottage tulips. It is possible that some of the varieties rightfully belong in the May-flowering rather than in the lily-flowered group.

The Mendel tulip is a new race, said to be hybrids between the early Duc Van Tholl and the Darwin tulips. It is stated that they pos-

sess the early flowering character of the Duc Van Tholl and the large flowers and brilliant colors of the Darwin group. Thirteen varieties are listed in one Dutch wholesale catalog; one American retailer lists seven varieties with prices from ninety cents to ten dollars a bulb.

In some catalogs a small amount of space is given to the botanical tulips. These are the wild species and botanical varieties, some of which are desirable for garden purposes. A few of the most desirable forms are *Tulipa clusiana*, the Lady Tulip, pink and white, with dark markings forming an eye at the bases of the petals; *T. fulgens maxima lutea*, better known as Mrs. Moon, a beautiful yellow with attractive form; *T. gesneriana spathulata*, brilliant red with dark markings at the bases of the petals; *T. retroflexa*, a pleasing yellow, whose twisted petals have wavy margins. The latter three are most commonly included among the May-flowering or Cottage tulips. *Tulipa persica* is desirable for the foreground of the border for the rock garden; in the bud stage the flowers show a beautiful bronze color, but on opening they form a beautiful yellow star. *Tulipa cornuta* var. *stenopetala* would appeal to lovers of Parrot tulips because of its laciniate or cut petalled flowers produced on tall, erect stems. *Tulipa praestans* is also

attractive because of its brilliant orange-scarlet flowers, several of which are produced on one stem.

Varieties of Tulips

With the great number of varieties from which to select it is difficult to present a limited list which will include the various colors that are found in the several types. In the wholesale catalog of one Dutch grower are listed 716 species and varieties; in three retail catalogs of American dealers are found listed respectively 121, 184, and 292 species and varieties. The aim in compiling the following list is to include those tulips which are within the limits of the purse of any home gardener, and to exclude varieties not readily obtainable or others which are comparatively high in price.

I. Early Flowering:

A. Common Single flowered.
Belle Alliance. Brilliant deep scarlet.
Chrysolora. Pure yellow.
Cottage Maid. Bright pink.
Couleur Cardinal. Intense crimson.
De Wet. Golden orange, marked with reddish orange.

Flamingo. Bright rose, with white margins.
Goldfinch. Deep yellow.
Keizerskroon. Crimson scarlet with yellow margins.
Lady Boreel. Pure white.
Pelican. Pure white; large blooms.
Prince of Austria. Orange-red.
Thomas Moore. Terra cotta tinged with rose.
White Hawk. Pure white.

B. Common double flowered.
Couronne d'Or. Orange-yellow.
Imperator Rubrorum. Red, yellow in in center.
Mr. Van der Hoef. Yellow.
Murillo. Blush pink, variable in color.
Tea Rose. Pale buff.

II. LATE FLOWERING:

1. Breeder.

Bronze Queen. Pale buff tinged with yellow inside.
Cardinal Manning. Rosy violet flushed with bronze.
Dom Pedro. Dark coffee brown shaded with maroon.
Golden Bronze. Golden brown.
Louis XIV. Dark purple with margin of golden brown; beautiful metallic sheen.

Prince of Orange. Terra cotta brown flushed with yellow.

A. Rose.

Athalia. White, feathered with pink.

Roi des Cerises. Cerise and white.

B. Bybloem.

Halley. Purple-lilac and white.

Flamboyante. Violet and white.

C. Bizarre.

Reine de Congo. Yellow and buff with very dark flames.

Sang de Boeuf. Black (so called) with yellow flames.

2. Darwin.

Anton Mauve. Deep bluish lilac.

Baronne de la Tonnaye. Beautiful rose, lighter near the margins.

Bartigon. Brilliant crimson with white at base of petals.

Clara Butt. Clear salmon pink.

Dream. Rose lilac with deep markings at base of petals.

Farncombe Sanders. Fiery scarlet rose, white inside at base of petals with blue markings.

Glow. Striking combination of crimson and scarlet, white inside at base of petals, blue markings.

King Harold. Dark crimson, darker inside; very large flower.

La Tulipe Noire. The so-called "Black Tulip." Very dark purple.

Massachusetts. Bright rose-pink, changing to soft pink at the margin.

Mme. Krelage. Light rose-pink, lighter near the margin.

Philippe de Commines. Very dark purple. Compare with "La Tulipe Noire."

Pride of Haarlem. Brilliant deep rose shaded with scarlet.

Rev. H. Ewbank. Pale lavender-violet, lighter near the margins.

White Queen. The best white Darwin.

William Copeland. Lilac-rose.

2. A. Rembrandt varieties.

Apollo. Rose-lilac and white.

Eros. White, suffused with lilac and with violet stripes.

Red Prince. Rose, flamed with scarlet-red.

3. Parrot varieties.

Feu Brilliant. Dark red with bluish-black markings.

Markgraaf. Inside golden yellow, outside feathered scarlet, purple and green.

Lutea major. Yellow, striped with red and green.

4. Double flowered varieties; seldom listed.

5. May-flowering or Cottage varieties.

Avis Kennicott. Yellow, black at base of petals and black stamens; striking.

Bouton d'Or. Golden yellow.

Gesneriana major. Large flower, brilliant crimson-scarlet with blue-black center.

Inglescombe Pink. Salmon rose.

John Ruskin. Beautiful blending of pink and yellow.

La Rêve. Large flower, combination of rose and buff; yellow base.

Moonlight. Egg-shaped flower; soft yellow.

Mrs. Moon. Rich yellow; petals narrow and reflexed at the tip; an excellent variety.

Picotee. White, margins feathered with pink; shows more pink as flower matures.

Picotee Yellow. Pale yellow with rose edge.

Retroflexa. Yellow, reflexed petals with wavy margins.

Scarlet Emperor. Glowing scarlet; a fine variety.

6. Lily-flowered varieties.

   Siren (Sirene). Urn-shaped flower; deep pink, with white base.
   Retroflexa (See group 5, May-flowering or Cottage).

7. Mendel varieties (expensive compared with others, seventy cents to ten dollars each.) At present listed in very few catalogs.

VI

THE NARCISSUS

SINCE narcissus bulbs cannot now be imported, except under special permit issued by the Federal Horticultural Board, the question may well be asked why a chapter on narcissus should be included in this book. Yet hundreds of thousands of narcissi were available in 1926 and will be available in future years, new varieties can be imported by complying with certain regulations, and many amateur gardeners will have bulbs which they may exchange with their friends for other varieties. Consequently, narcissi will continue to be grown even if it is impossible to obtain bulbs as easily as in previous years.

In the opinion of the author the narcissus is the most desirable of all the spring flowering bulbs. The tulip provides colors as delicate, as gaudy and gorgeous as poppies, the hyacinth carries fragrance and formality, but the narcissus has grace, variety in form, softness and depth of color, fragrance in many types,

and strength of stem. It has hardiness to withstand severe winter conditions, most varieties multiply fairly rapidly, and the group as a whole is adapted to a wide range of purposes. Also, the narcissus does not require as rich a soil as the tulip or hyacinth. The practice of the Dutch bulb producers, which is said to be as follows, illustrates this point: a heavy application of cow manure is made in winter; this is followed by a crop of potatoes which are dug early; hyacinths are then grown for a year, followed by tulips for a year, which in turn are followed by narcissi. If the narcissi are left in the ground for two years, a mulch of manure is given the second year; otherwise the first application of cow manure is sufficient for these four crops, one of potatoes and three of bulbs.

The narcissus is a member of the amaryllis family (*Amaryllidaceae*), in which are included very few of our garden flowers, the group under consideration being the most important. Many tender plants, such as amaryllis and hippeastrums with their gaudy colors, agapanthus with its umbels of beautiful blue flowers, clivias and crinums, are some of the more familiar relatives of the narcissus. The origin of the name is rather interesting; according to mythology Narcissus was a beauti-

ful youth who was loved by Echo; her love not being returned, she died. To punish him for his unfeeling heart Nemesis caused Narcissus to fall in love with the reflection of himself in the water; he pined away in his desire for his reflection and when the Naiads came to bury him they found only the flower which bears his name.

There is one question in regard to this group of plants which probably will never be settled satisfactorily as far as all parties are concerned; that is: what are the differences between narcissi, daffodils, and jonquils? One part of it is easily settled, all daffodils and jonquils are narcissi, but the rest of it, which are daffodils and which are jonquils is not so quickly explained. To many people the term "daffodil" refers to the old-fashioned double flowered variety, *Telamonius plenus* or Van Sion while "jonquil" refers to any single flowered form except the short trumpet types; these latter are called the narcissi. Thus, such varieties as Victoria, Sir Watkin, Mrs. Langtry, and *Barri conspicuus* would be called "jonquils." However, the chief distinguishing characters of the two groups are the leaves. All those varieties which have flat or grass-like leaves (much greater in width than thickness) should be called daffodils; those which

have leaves of approximately the same thickness and width (the rush-leaved forms) should be known as jonquils. In spite of all that may be said or written, local common names for the various types will continue in use, no matter how easily the daffodils and jonquils may be separated. It is said that Sweet, the famous British botanist, died in the madhouse as a result of his attempt to straighten out the species of narcissus. Let no one be sent to the madhouse in this present day and generation simply because of worry over daffodils and jonquils.

Since there are so many kinds of narcissi grown in gardens, some kind of classification is necessary. A horticultural or garden classification is more desirable from the viewpoint of the home gardener than a purely botanical key. The value of a classification is not always evident to the home gardener, but when he realizes that approximately twenty-five hundred varieties of narcissi are included in the "Classified List of Daffodil Names" of the Royal Horticultural Society of England (1923), he must come to realize that some sort of grouping of similar forms is desirable. In this garden grouping it is essential to know that the flower of the narcissus is composed of six segments, commonly spoken of as petals,

which make up the perianth; in the center of the flower is found the corona, crown, or trumpet, of varying length, form, and color; within the corona or protruding from it are located the six stamens and the pistil. In double forms the number of segments is increased greatly, especially in the old double daffodil, Van Sion.

The classification which is given below is that which is used by the Royal Horticultural Society of England in connection with its exhibitions and in its registration of varieties. Not all of these groups are used by American dealers, but this classification is so definite and concise that it might well be adopted in its entirety.

Division I—Trumpet Daffodils

Distinguishing character—Trumpet or crown as long as or longer than the segments of the perianth.

(a) Varieties with yellow or lemon-colored trumpets, and perianth of same shade or lighter (but not white).
Example: King Alfred.

(b) Varieties with white trumpet and perianth.
Example: Mme. de Graaff.

(c) Bicolor varieties, i.e., those having a white

or whitish perianth and a trumpet colored yellow, lemon, or primrose, etc.

Example: Victoria.

DIVISION II—INCOMPARABILIS

Distinguishing character—Cup or crown not less than one-third but less than equal to the length of the perianth segments.

(a) Yellow shades with or without red coloring on the cup.

Example: Sir Watkin.

(b) Bicolor varieties with white or whitish perianth, and self-yellow, red-stained or red cup.

Example: Lucifer.

DIVISION III —BARRI. (Incorporating Burbidgei)

Distinguishing character—cup or crown less than one-third the length of the perianth segments.

(a) Yellow shades, with or without red coloring on the cup.

Example: *Barri conspicuus.*

(b) Bi-color varieties with white or whitish perianth and self-yellow, red-stained, or red cup.

Example: Sea Gull.

DIVISION IV—LEEDSI

Distinguishing character—Perianth white, and cup or crown white, cream or pale citron, sometimes tinged with pink or apricot.

(a) Cup or crown not less than one-third but less than equal to the length of the perianth segments.

Example: Lord Kitchener.

(b) Cup or crown less than one-third the length of the perianth segments.

Example: White Lady.

Division V—Triandrus Hybrids

All varieties obviously containing *Narcissus triandrus* blood such as Queen of Spring, Earl Grey, Eleanor Berkeley, Moonstone, Agnes Harvey, etc.

(a) Cup or crown not less than one-third but less than equal to the length of the perianth segments.

(b) Cup or crown less than one-third the length of the perianth segments.

Narcissus triandrus, one to several flowers on a stem, horizontal or drooping, segments of perianth sharply reflexed, and corona cup shaped.

Division VI—Cyclamineus Hybrids

Example: February Gold.

Narcissus cyclamineus, segments abruptly reflexed (like petals of a cyclamen), corona as long as the segments.

Division VII—Jonquilla Hybrids

All varieties of *N. jonquilla* parentage such as Buttercup, *odorus*, etc.

Narcissus jonquilla, two to six flowers, segments of perianth yellow, very short, one-eighth inch or less; leaves rush-like.

Division VIII—Tazetta and Tazetta Hybrids

To include *N. Tridymus,* Poetaz varieties, the Dutch varieties of Polyanthus Narcissus ("Bunch Narcissi"), *N. biflorus, N. Muzart,* and *N. intermedius.*

Poetaz varieties are the most common garden representatives.

Example: Elvira.

Division IX—Poeticus Varieties

Narcissus poeticus, flowers solitary, rarely two on a stem, segments white, corona, yellow with red margin, one-sixth inch or less.

Example: King Edward VII.

Division X—Double Varieties

Examples: Van Sion, Orange Phoenix, *Albus plenus odoratus.*

Division XI

To include *N. Bulbocodium* (Hoop Petticoat Narcissus), *N. cyclamineus, N. triandrus, N. juncifolius, N. gracilis, N. jonquilla, N. Tazetta, N. viridiflorus,* etc. (Botanical species).

Those forms which are included in Divisions I, II, III, IV, VII, VIII, IX, and X are most

commonly grown in American gardens, probably because the other forms are not commonly listed in American catalogs.

In connection with Division VIII, it should be remembered that the Tazetta varieties are not hardy in the northern States. To this group belong such forms as the Paper White narcissus, so commonly and easily grown in pebbles and water, the Joss lily or Chinese sacred lily which is easily grown in the same manner, the beautiful Soleil d'Or, and other related varieties.

The story of the origin of the Poetaz type is interesting as related by Joseph Jacob in The Garden (England, 1909). "In the year 1885 there happened to be growing side by side in the bulb fields of Messrs. R. Van der Schoot and Son, at Hillegom, some beds of Ornatus and different kinds of Tazetta. A happy inspiration suggested that an attempt should be made to cross them. . . . There was a fair crop of seed, which in due course was sown and germinated. . . . The Poet shows itself in the larger flowers and in some of the cups, while the Tazetta appears in their having several flowers upon one stem. To sum up, they may be described as a large flowered Polyanthus narcissus, having from two to six blooms on a stem, more pleasantly

scented, and generally speaking, with a looser and more artistic perianth." To these should also be added the quality of hardiness.

Narcissus bulbs which are used for garden purposes are graded according to form and age rather than by size, as is the case with hyacinths, for example. Exceptions to this rule are the Paper White narcissi and bulbs that are to be used as "planting stock," that is, for the production of bulbs commercially; these are graded according to the circumference of the bulbs. The others may be placed in the four classes which are described in the following paragraphs.

The first includes those which are known as "mother" bulbs, those from which the offsets or side growths ("slabs") have not been removed for "planting stock" use; such bulbs are naturally high in price but each one should produce several flowers; in the case of many varieties flowers are produced by the offsets as well as by the large bulb. It is doubtful whether many mother bulbs will be offered for sale by American growers in the near future since they will wish to hold as much stock as possible for planting purposes.

The second class includes those which are known as "double nosed bulbs," that is, they have two growing points from which leaves

will arise and should produce at least two flowers. They are similar to the mother bulbs except that the side growths or slabs have been removed. They are intermediate in price between mother bulbs and first size round bulbs.

The third class includes those known as "first size, round bulbs"; the question of size is a relative matter since varieties differ greatly in this respect; for example, a first size bulb of Emperor would be much larger than a first size Poeticus King Edward VII. Such bulbs do not have offsets, and usually produce one flower or one flower stem only; they are considered to be especially desirable for garden purposes.

The fourth is called the "second size, round bulb," it is the smallest size of narcissus bulb that will produce a flower; naturally it is lowest in price, but the flowers are usually smaller than the others and are produced on shorter stems.

At present the choice of varieties for the average home gardener is limited to those which are being produced by American growers. The following list of varieties is compiled on that basis. Others, for persons who can afford the expense and wish to go through the necessary "red tape," may be obtained from

growers on the other side of the water. Varieties are arranged according to the classification previously given.

DIVISION I—TRUMPET DAFFODILS:

(a) Emperor, King Alfred, Van Waveren's Giant.
(b) Mme. de Graaff.
(c) Victoria, Empress, Glory of Sassenheim.

DIVISION II—INCOMPARABILIS:

(a) Sir Watkin, Gloria Mundi.
(b) Lucifer, Will Scarlett.

DIVISION III—BARRI:

(a) *Conspicuus,* Blood Orange.
(b) Seagull, Firebrand.

DIVISION IV—LEEDSI:

(a) Lord Kitchener.
(b) White Lady, Mrs. Langtry, Queen of the North.

DIVISION V—TRIANDRUS HYBRIDS (Very few listed):

Queen of Spain.

DIVISION VI—CYCLAMINEUS HYBRIDS:

(a) February Gold.
(b) March Sunshine.

DIVISION VII—JONQUILLA HYBRIDS:

Buttercup, *Campernelle Rugulosus.*

DIVISION VIII—TAZETTA AND TAZETTA HYBRIDS:

Poetaz group; Elvira, Laurens Koster.

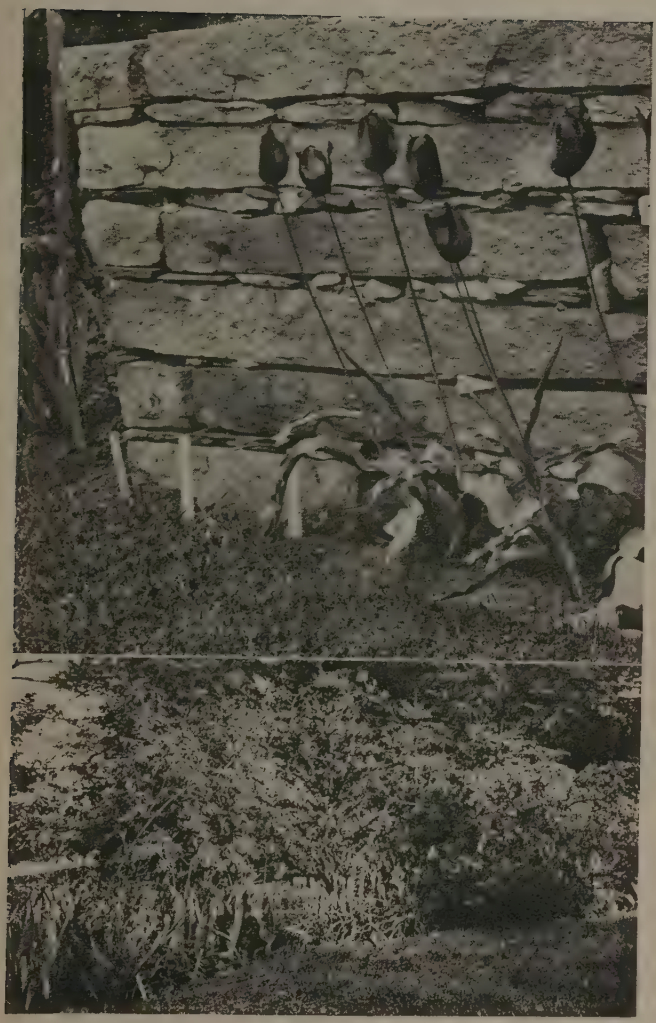
DIVISION IX—POETICUS VARIETIES:

Ornatus, King Edward VII, Recurvus, Thelma.

DIVISION X—DOUBLE VARIETIES:

Telamonius plenus or Van Sion (same as old fashioned double daffodil), Orange Phoenix, *Albus plenus odoratus.*

DIVISION XI—VARIOUS: (Seldom available now.)



(Upper) May-flowering Tulip Scarlet Emperor is beautiful against the gray stone wall in this backyard garden.

(Lower) A combination of Narcissus Mme. de Graaff (extreme left), early flowering Tulip Goldfinch, and Grape Hyacinth Heavenly Blue.

Muscari, or Grape Hyacinth, Heavenly Blue, adds a valuable bit of color to the border in this location, planted near early Tulip Goldfinch (yellow).

VII

THE HYACINTH

ALTHOUGH the hyacinths are unquestionably used less for outdoor planting than either the narcissi or the tulips, they possess certain qualities which make them desirable and deserving of greater use. William Robinson, the noted English garden author, says: "The familiar garden hyacinth is not generally included among hardy plants, though it is perfectly hardy and, when treated as it should be, is most important."

In the first place, the only blues in taller growing, spring flowering bulbs are found in the hyacinths; among the low growing small flowered bulbs, beautiful tones of blue are found in scillas, chionodoxas, muscari, but in tulips and narcissi, there is no such thing as a blue or near blue. Also, the hyacinths have a fragrance which is possibly rather cloying for indoor use if many bulbs are grown, but pleasing indeed in the garden. The tulips have odor, but many of the narcissi and the

hyacinths have fragrance. Lastly, the habit of growth of the hyacinths makes them especially fit subjects for bedding purposes; by nature stiff, set and formal, the flower spike lends itself well to use in beds. One writer says that they give excellent results when planted in drifts along the margins of shrub borders or woods and in herbaceous borders. However, they are not pleasing when naturalized in the grass.

The hyacinth, like the tulip, is also a member of the lily family (*Liliaceae*). The name of the genus, *Hyacinthus*, is derived from the Greek. According to mythology the youth Hyacinthus was beloved by Apollo but was unfortunately killed by the latter by an unlucky throw of the discus. Apollo caused the hyacinth to spring from the blood of Hyacinthus but whether it is the hyacinth of today is a question. Another version states that Hyacinthus was killed by Zephyrus, god of the west wind, because of jealousy. So much for the significance of a scientific plant name.

The varieties of hyacinths that are used in gardens have been obtained from one species or wild type, *Hyacinthus orientalis*, the common or Dutch hyacinth. This name does not necessarily imply that the plant is native in Holland. Rather it refers to the fact that

most of the hyacinth bulbs are produced in Holland, very few being grown commercially in other countries. In this connection it is interesting to note that there were indications of a "hyacinth mania" in Holland in 1734. To forestall this possibility a third edition of "t' Samenspraecken" was published, the first edition of which, as already stated, had been published in 1637 in an effort to check the evils of the tulipomania.

Colors in hyacinths are numerous, more extensive than in narcissi, but not having the wide range that is found in the tulips; clear, glistening whites, flesh and pale pinks, roses, so-called reds (not spectrum red by any means), pale blue, deep blue, and beautiful intermediate tones, lavender to purple, and even yellow. Possibly an author should not state his personal preferences, but in the hyacinths the present writer prefers the white, the pale pink, the pale blue, and the yellow varieties.

Hyacinthus orientalis var. *albulus,* the Roman or French Roman hyacinth, is not adapted to outdoor use in the northern States because of its tenderness. The individual flowers or "bells" are smaller and are produced more sparingly on the stem than are those of the Dutch hyacinth; consequently the spikes

are extremely light and graceful. This type was formerly used in great quantities by commercial florists for forcing purposes, but because of diseases which attack the bulbs in the European bulb fields, it is seldom seen now in the florists' stores.

"Miniature" hyacinths, sometimes called the Dutch Roman hyacinths, are hardy and may be used both for outdoor planting and for forcing indoors. They are bulbs which average about thirteen centimeters (about five inches) in circumference, are fully mature but do not produce as large spikes of flowers as do first or second size bulbs (eighteen and sixteen centimeters,—about seven and six inches respectively). For this reason especially they are more desirable since the flower spikes will stand erect without support. First size bulbs are recommended for forcing, in particular for exhibition purposes; second size bulbs are considered very desirable for outdoor planting.

Hyacinths can yet be imported from Holland under such restrictions as apply to tulips, crocus, and a few others. Some are being produced by growers in this country; there are men in California, Washington, Oregon, and other states who are raising hyacinths, but the number of such bulbs is very small indeed as compared with narcissi and tulips. Some of

these American grown bulbs have recently been placed on the market.

When it comes to the question of varieties, there is not nearly so great a number from which to select as in the case of either tulips or narcissi. One writer has stated that there are several hundred varieties of hyacinths. As I write I have before me a wholesale catalog of a Dutch bulb producing concern in which are listed approximately 100 varieties. I have also before me catalogs of several leading American dealers, no one of whom lists more than 24 varieties, which number would very likely include the cream of the Dutch lists. Single flowered varieties are more desirable than double flowered forms, the latter producing spikes which are extremely heavy in character. A spike of single hyacinth flowers creates at best a heavy, stiff, and formal effect; consequently when a double flowered variety is used, with its increase in number of floral parts, the effect becomes even more formal. It is frequently difficult to purchase bulbs of the double flowered varieties because they are grown in such small quantities. Many American retailers do not list them in their catalogs.

Below is given a list of varieties which are commonly found in the trade and give satisfaction when used for garden purposes.

A. Single Flowered Varieties:

1—White.
- La Grandesse.
- L'Innocence.
- Queen of the Whites.

2—Pink, rose and red.
- General De Wet.
- Gertrude.
- Gigantea.
- Lady Derby.
- Queen of the Pinks.
- La Victoire.
- Moreno.

3—Pale and deep blue.
- Queen of the Blues.
- Czar Peter.
- Schotel.
- King of the Blues.
- Grand Maitre.

4—Lavender and purple.
- Lord Balfour.
- Sir William Mansfield.

5—Yellow.
- City of Haarlem.
- Yellow Hammer.

B. Double Flowered Varieties:
- La Grandesse. White.
- Bloksberg. Pale blue.
- Garrick. Bright blue.
- Bouquet Royal. Rose.

VIII

OTHER HARDY SPRING FLOWERING BULBS

In this chapter are included the miscellaneous groups, sometimes called the "small" bulbs, but more properly "minor" bulbs since they do not attain equal importance, commercially or in garden value, with the tulips, hyacinths, and narcissi. They are small in size of flower, in height, and in size of bulb, but they are none the less desirable; most of them are early bloomers and several of them provide beautiful blue tones which are decidedly lacking in tulips and narcissi.

At present it is difficult to obtain some of these minor bulbs. Stocks of great size have not as yet been worked up by commercial growers; however, it is probably only a question of time when they will be available in unlimited quantities. The chief difficulty appears to be in the fact that certain of these bulbs cannot be propagated commercially by division or splitting of the bulbs, but must be

grown from seeds. Since it may require three years or more for such seedlings to reach blooming size, it will readily be seen that large commercial stocks will become available slowly.

Possibly the method of considering these bulbs in alphabetical order will prove as satisfactory as any other; it is certainly much simpler than would be an attempt to arrange them in order of importance.

Anemone

It is questionable whether the bulbous anemones can be recommended for general use because of their lack of hardiness. In the greater part of New England and the Eastern States, in fact in any region of cold winters, thorough protection is necessary. It is sometimes advocated that they be carried through the winter in cold-frames with careful protection. The anemone belongs to the botanical family *Ranunculaceae* (Buttercup family) which also includes the peony, columbine, larkspur, meadowrue, and other garden flowers. The most commonly grown species of the bulbous type is *Anemone coronaria*, the Caen anemone; semi-double and double forms are included under the varietal name "St. Brigid."

The flowers resemble buttercups in form but they possess colors which are entirely foreign to this common flower of the fields—beautiful tones of red, violet, and purple, and varying to white; not the least attractive feature of the flower is the mass of stamens, especially noticable in the single flowered forms. The flowers are about two and one half inches across and are produced on stems of varying length, eight inches more or less. Most of the leaves are produced at the crown of the plant, forming more or less of a ground cover and background for the flowers.

In addition to being desirable for garden purposes, they are excellent for use as cut-flowers and may be forced quite readily. They are so easily grown from seed that they should be used in quantities in regions where they can be easily carried over winter. Plants from seeds sown indoors in April and transplanted to the garden or cold-frame will begin to flower in early September and will continue until severe freezes injure the growth. If planted in cold-frames, they may be covered with sash in the fall and will provide flowers for cutting, long after hardy chrysanthemums are past. At the date of writing (December first) the author has been able to pick a bouquet of these flowers from an uncovered cold-frame,

due in great measure to the mildness of the season in New England. Dormant bulbs or tubers, planted in a sheltered spot well protected, are used for spring bloom.

Chionodoxa

Anyone desiring blue flowers in the foreground of the herbaceous border, as an edging for beds, at the edge of the shrub border or in the rock garden, should by all means have some of the Chionodoxas. This name is not as formidable as it appears, for it means literally "glory-of-the-snow," the common name that has been given to the plant. Like the hyacinth it is included in the lily family (*Liliaceae*). There are two species that are commonly listed, *Chionodoxa sardensis*, with dark blue flowers (no white present) and *C. luciliae*, more nearly a bright sky-blue with white on each segment or petal, so that it creates the effect of a white throat. They might possibly be confused with the Scillas or squills, but the flowers of the Chionodoxas have short corolla tubes. They are extremely hardy, but it must be remembered that they do not increase rapidly by multiplication of the bulbs; consequently they must be planted rather closely, two or three inches apart, to

produce mass effects. New bulbs are obtained from seeds, three or four years being necessary to bring the bulbs to mature size.

Crocus

The crocus is assuredly the most important of the hardy spring flowering bulbs included in the iris family (*Iridaceae*). The fall flowering forms, which are planted in August, should be mentioned in passing, but they do not come within the scope of this book. A second fall flowering group includes the Colchicums, also called fall crocus, of the family *Liliaceae* (lily family); they are interesting because they make their growth in the spring and produce flowers in the fall when the leaves have disappeared.

The spring crocus, "heralds of spring," or "harbingers of spring," as they are commonly called, are particularly desirable for naturalizing in the grass, in the foreground of the shrub border, or for grouping in the foreground of the herbaceous border. When they are naturalized in the grass, it is essential that the leaves should be allowed to complete their growth before they are taken off with the lawn mower. It is therefore desirable to select a location where the grass need not necessarily

be cut early in the season or where one does not object if the area may become somewhat unkempt. A serious objection to the crocus is the fact that the corms or bulbs are frequently infected with a fungus disease which causes rapid decay. If diseased bulbs are planted, it may be expected that many of them will not flower or grow the following season.

The typical colors of the crocus are white, golden yellow, purple or violet (frequently spoken of as blue), and purple and white striped forms. The yellow types are supposed to have been derived from *Crocus susianus*, the Cloth-of-Gold crocus, the others chiefly from *C. vernus*, the spring crocus. A few of the desirable varieties are:

Kathleen Parlow. White.
King of the Whites.
Baron von Brunow. Deep purple.
Julia Culp. Purple with light margin.
Purpurea Grandiflora. Large, purple.
Pallas. Purple and white. Striped.
Sir Walter Scott. Striped, white and pale purple.
Golden Yellow. Early.

Eranthis

One of the early spring flowering bulbs which is not as generally known as it should

be is the little *Eranthis hyemalis*, or Winter Aconite, included in the buttercup family. Possibly one reason for its lack of popularity is the fact that is is not commonly listed in bulb catalogs, which in turn would imply that the bulbs are not grown on a large scale commercially. They are propagated from seed most satisfactorily, and the tubers are so small that, as one writer has said, they are best removed from the soil by screening, which is naturally an objection on the part of the commercial producer. The plants bloom very early in the spring, (with the crocus or earlier), produce yellow flowers like buttercups on stems four to six inches in height, and adapt themselves readily to shady or partially shaded conditions.

Erythronium

The representative of this group that is most commonly seen in the eastern part of the country is the Adder's Tongue or Dog-Tooth Violet, (*Erythronium americanum*). The plant does not bear any relation to the true violets as it is included in the lily family (*Liliaceae*). Large patches of this species are frequently seen in the woods in the spring, beautiful because of their mottled foliage and attractive yellow flowers. The Erythroniums

of the far West are seldom seen in eastern gardens, but they are deserving of greater popularity; not only are there yellow forms but also white, pink, cream, and rose. Purdy states that they (the western forms) are woodland plants and should have light shade at least; also, that in California they are found in almost any soils except marshy soils. Failure may be due to drying out of the bulbs after digging or to breaking of the long bulbs in planting. Winter killing apparently is caused more by alternate freezing and thawing than by severe cold.

Fritillaria

One of the bulbous plants commonly found in old gardens was the Crown Imperial or *Fritillaria imperialis*, now rather infrequently cataloged. With its pungent odor, calling to mind that prowler of the night, the skunk, or wood pussy, it is difficult to realize the plant could be included in the same botanical family with the fragrant Easter lily. The drooping flowers usually seen in May are produced in umbels or clusters at the top of a vigorous stem which may be three to four feet in height. The colors are chiefly in tones of yellow to reddish orange. Named varieties may be pur-

chased but, as stated previously, they are not commonly listed in American catalogs.

Fritillaria meleagris, the Guinea-hen flower, or Checkered Lily, so called because of the markings on the flower, is more easily available. The bulbs are small, the plants of slender growth, with narrow foliage and nodding bell-shaped flowers, chiefly in the lighter tones of purple, produced in April. Their gracefulness and airiness are quite in contrast to the robust, bold character of the Crown Imperial.

Galanthus

The common snowdrop, known to the botanist as *Galanthus nivalis*, and included in the Amaryllis family (*Amaryllidaceae*) should be used in more home gardens, especially if there is a spot where it can be planted and left undisturbed for a period of several years. It does not want to be "babied," neither does it like to be fed heavily. Allowed to take care of itself it will usually bloom freely. The three outer segments or petals are white, the three inner white with a greenish spot near the tip of each. They appear so extremely early, sometimes even in February, that they make a valuable addition to the garden or border. It should be borne in mind that the bulbs

should be planted early in the autumn for they are injured if they are left out of the ground for any great length of time. *Galanthus elwesi*, the Giant Snowdrop, may be found in some catalogs.

Leucojum

The Spring Snowflake, *Leucojum vernum*, and its companion the Summer Snowflake, *L. aestivum*, are seldom listed in catalogs, but should be included in the garden of the bulb enthusiast. The name Snowflake is sufficient to convey an idea of their color and form.

Muscari

This group of little flowers, commonly known as Grape Hyacinths, (quite different from the true hyacinths although both are included in the lily family) is deserving of great popularity. The form most frequently seen is *Muscari botryoides*, the real grape hyacinth, with its clusters of drooping, inverted, urn-shaped flowers of a beautiful light tone of blue produced on stems six to nine inches high. The variety Heavenly Blue is a better form and for those who wish a white form there is the variety *album*. The season of bloom is usually from early to middle May, depending

An open background, but a beautiful little colony of Spanish Squill or Wood Hyacinth *(Scilla campanulata)*.

(Upper) Darwin Tulips are very effective in the foreground of the shrub border. Two dozen bulbs will produce this result.

(Lower) The English Squill *(Scilla nutans)* flowers earlier than the Spanish Squill, and is not quite as tall. (See preceding page.)

upon the location where they are planted. They are excellent for naturalizing in the grass, for use in the foreground of the mixed border, and for edging formal plantings. Effective combinations may be made with grape hyacinths and early flowering tulips, since they bloom at approximately the same time; an example of such a planting might include tulips Chrysolora (yellow), White Hawk (white), and Heavenly Blue grape hyacinths.

Probably the greatest freak among the spring flowering bulbs is the feathered hyacinth, *Muscari comosum* var. *plumosum*, sometimes listed as *Muscari plumosum*. It is an abnormal flower which looks as much like a tangled bunch of lavender-blue threads as anything, and is not to be compared in beauty with the true grape hyacinth.

Ornithogalum

Ornithogalum umbellatum, the Star of Bethlehem, may not be frequently found in catalogs, but it is often seen in old time gardens. The plants produce abundant foliage and numerous white star-shaped flowers on short stems. They should not be confused with the indoor plant called the Star of Bethlehem, *Campanula isophylla*.

Ranunculus

The bulbous buttercups which flower in the spring can not be recommended for general use, at least in cold climates, because of their lack of hardiness. They are not considered as hardy as bulbous anemones. If they are to be used in the home garden, they should be planted in a well sheltered spot, preferably where the soil is or can be kept fairly dry.

Those which are grown are varieties of the Persian Buttercup, *Ranunculus asiaticus*. The tubers are sometimes described as being similar to a miniature clump of dahlia tubers. They should be planted with the "claws" or tubers pointing downward.

Scilla

Like the Muscari or grape hyacinth, the Scilla or Squill is included in the lily family and is also valued for its clear blue flowers; other colors are to be had in certain species but the blue forms are most frequently grown. They are excellent for naturalizing in the shrub border, for the rock garden, and for the foreground of the herbaceous border.

The first to bloom is *Scilla sibirica*, sometimes listed as *Scilla amoena*, the Siberian

Squill, which shows its intense blue flowers in April or early May; the height of the flowering stems is seldom more than four inches, sometimes even less. There is also a white flowered form. In general the best results are obtained if the bulbs are planted out and allowed to take care of themselves.

Scilla nutans (or *S. hyacinthoides*) the English Squill, flowers a little later and bears its bell-shaped flowers on slightly taller stems which arch gracefully. The writer has seen both blue and white forms naturalized in a planting of Japanese Spurge (*Pachysandra terminalis*) with very pleasing results.

The Spanish Squill or Wood Hyacinth, *Scilla campanulata* (*S. hispanica*) is the tallest of the three species, seldom more than 12 inches high (sometimes 15 inches), with flowers that bear some resemblance to the hyacinth. Normally it is the latest of these species to flower, although there may frequently be some overlapping. There are white, pink or pale rose, and blue forms. They may be used for the same purposes as the others, but are probably the best for use in the herbaceous border.

Scilla bifolia, the Twinleaf Squill, another blue form, is not so commonly listed as the others.

IX

INSECT PESTS, DISEASES, AND OTHER TROUBLES

FORTUNATELY the number of insect pests and diseases which attack spring flowering bulbs is comparatively small. However, included in this number are several which are responsible for heavy losses on the part of commercial growers. It must also be remembered that there are other insect pests and diseases in various parts of the world, unknown in this country at present, which if allowed to enter and become established might become very destructive. Therefore, it is hoped, by quarantine regulations and inspection of imports, that these plant foes may be kept out of the country. The point of view of the extremist would be to allow free entry to all such diseases and pests and, after determining methods of controlling and combating them, to build up permanent agricultural and horticultural industries. In theory such a sys-

tem might appear desirable, but very likely it would not work out well in practice.

Insect Pests

The information concerning the narcissus flies and the bulb mite has been taken from Farmers' Bulletin 1362 of the United States Department of Agriculture, "Insects Injurious to Ornamental Greenhouse Crops," by Weigel and Sasscer.

The narcissus or daffodil fly (*Merodon equestris* Fab.)—Like its companion, the lesser bulb fly (*Eumerus strigatus* Fallen), the narcissus fly or daffodil fly has been repeatedly intercepted in bulb shipments received from Europe, and occasionally a large percentage of the consignment is infested, with resulting loss. Among the bulbs known to be hosts of this insect are the amaryllis, hyacinth, narcissus, galtonia, tulip, and a few others. The maggots usually feed in the center of the bulb, and their presence is not readily detected unless the bulbs are handled, when they usually "give way" to the least pressure of the hand. Unlike the lesser bulb fly, however, only one maggot normally inhabits a bulb, although at times two or three may be found.

This insect is one-brooded, passing the win-

ter in the larva stage, within the bulbs, in the soil. Pupation takes place in the old burrow or in the soil near by. The adults appear in the early summer and deposit small, oval, white eggs on the plants near the base of the leaves, or in exposed portions of the bulbs. After eating their way through the tender scales they feed within the heart of the bulb and later hibernate. The legless maggots or larvæ are dirty white or yellowish in color, and about three-quarters of an inch long, while the pupæ are elongate, grayish brown, and segmented. The adult flies are large, hairy, two-winged, black, usually banded with yellow or gray, and about half an inch long, resembling a bumblebee in appearance.

The lesser bulb fly (*Eumerus strigatus* Fallen).—The economic status of this insect, which is also known as the lunate fly, or onion fly, is still in dispute. In view of its reputation as an onion pest in Europe, however, and recent records of its destruction of bulbs in this country, it may prove to be a real menace to florists and horticulturists. Its future activities, therefore, deserve close attention. Although it was first noted as occurring in the United States in 1906, it has since been reported to be established in California, Colorado, Maine, Ohio, New York, Texas, and

Washington. Its host plants include amaryllis, onion, iris, hyacinth, shallot (*allium*) and narcissus. Apparently narcissus seems to suffer most from its attack.

According to literature, the flies appear in May and June, and at this time lay their eggs on the bases of the leaves. The larvæ which hatch from these eggs in the nose of the bulb feed and work their way into the interior, causing it to become discolored, slimy, and decayed. As many as 77 larvæ have been found within a bulb. When full grown the maggots are from one-third to one-half inch long, dirty grayish yellow, and wrinkled. Pupation takes place in the bulbs or in the surrounding soil during August, and it is believed that the larvæ which hibernate in the bulbs are those of a second generation, from which the adults or flies emerge the following spring. The fly has one pair of grayish wings, is about one-third of an inch long, and has a bronzy black abdomen marked with three white crescent-shaped bands, the tip being beset with yellowish hairs. They fly among the flowers of various plants and are usually out on bright sunny days.

Control is the same as for the preceding species. (See page 108).

Bulb Mite.—It is safe to assume that a

large percentage of all foreign bulbs are infested at the time they arrive in this country with one or more species of mites. Of these the more important are the "bulb mite" (*Rhizoglyphus hyacinthi* Boisd) and a closely related species (*Rhizoglyphus rhizophagus* Banks). The former has been found to attack narcissus, Easter lily, tulip, hyacinth, crocus, amaryllis, dahlia, and orchid. Of these, narcissus and Easter lily suffer most severely and tulip and hyacinth to a less extent, owing to the apparent inability of the mites to penetrate readily the tightly overlapping scales.

Injury.—The mites burrow into the roots and stems of the bulbs and cause reddish-brown spots on the bulb scales. After heavily infested bulbs are planted the new leaves soon become yellow, growth is checked, and the flowers may fail to develop. In addition to the above injury, the mites are also believed to spread certain bacterial and fungous rots to healthy bulbs.

Although the mites are capable of living in diseased bulbs, there is much evidence to indicate that they prefer sound bulbs. Mites are frequently associated with decay in the bulbs, although feeding usually takes place in a healthy area beyond the decayed portion.

Life history.—The adult female deposits

singly from 9 to 56 small white eggs beneath the scales of the bulb or on the tissue at the base of the bulb among the roots. As many as 130 eggs have been reported[1] as deposited by a single female. These eggs require from one to ten days to hatch, depending on the temperature. The six-legged larvæ bore their way into the tissue and feed from one to three days, after which they become inactive or quiescent for one-half to two days, while the eight-legged nymph is forming within the larval shell. The nymph on emerging feeds from one to four days before passing into a quiescent stage, which lasts from one-half to three days. The adult then emerges, mates, and begins egg laying almost immediately.

Under certain conditions, such as lack of food, dryness, or the presence of predacious enemies, a new form, called hypopus, may develop between the nymphal stages. This is a small, brown creature, which is very resistant to unfavorable conditions, and is adapted for migrating to a fresh food supply by clinging to any moving object such as small flies or predacious mites.

The normal life cycle, exclusive of the hypopal stage, may require from 9 to 27 days, so

[1] See Bulletin 225 of the Connecticut State Agricultural Experiment Station, New Haven.

that under favorable conditions, such as are present in greenhouses, 10 or more generations may develop in a year. Female mites may live several weeks or months, but the males are usually short lived, dying in about 10 days or less.

Control.—Careful selection of bulbs to be planted is the first consideration in escaping an infestation of mites. Observe also the following suggestions:

Burn all soft and rotten bulbs.

Use care in growing and fertilizing the plants.

Bulbs kept in cold storage should be held at about 35° F.

The most successful treatment for infested bulbs[1] is to immerse them for 10 minutes in a solution of 40 percent nicotine sulfate at the rate of 1 to 400, heated to 122° F. The grower may also use nicotine oleate at the above temperature, hot water at 131° F. for 10 minutes, or a 2 percent formalin solution heated to 122° F. for 10 minutes.

Since the publication of the bulletin containing the above information, the hot water treatment has been found especially satisfactory and is being used to a great extent by commercial growers of narcissus bulbs. Because of the equipment required the practice is better

adapted for use by bulb producers than by home gardeners. For further information concerning this treatment the reader is referred to the brief discussion of the eelworm and methods of control.

A third pest which is proving destructive to narcissus bulbs in England and Holland in particular is the nematode, commonly called eelworm (*Tylenchus dipsaci* Kuhn). It is not native in this country, but if allowed to become established here, there is danger of its causing great loss to some economic crops. The nematode, which is frequently spoken of as a disease, is a microscopic organism which may work in various parts of the plant. To the amateur, methods of recognizing the so-called disease are important. Weigel and Sasscer in their bulletin state that "the disease is detected by irregular raised areas and finally lesions on the leaves in the growing condition, also by discolored rings and streaks in the bulbs. The active stage of the organism occurs as the weather becomes warm in the spring."

The hot water treatment or "cooking" treatment which has been developed especially by English and Dutch growers and experimentalists has been and is being tried and studied extensively by commercial growers and by

State and Federal government authorities. Doucette of the Bureau of Entomology of the United States Department of Agriculture stated in 1926 that the most satisfactory treatment recommended for the control of this nematode is immersion of the bulbs in water held at a temperature not lower than 110° F. nor higher than 112° F. for a period of at least three hours. This same treatment, as is shown by Doucette's records, was also effective in controlling both narcissus flies and the bulb mite.

Thus, it will be seen that if narcissus bulbs have been given the hot water treatment, the home gardener should not be troubled with either of the bulb flies, the bulb mite, or the eelworms.

Ants may at times be present in plantings of bulbs and may appear to be causing injury. However, as a rule they are not harmful unless they loosen the soil around the bulb and roots to such an extent that the plant suffers from lack of moisture.

Plant lice or aphids seldom attack spring flowering bulbs when grown outdoors. If they do appear during the active growing period, they may be controlled with the use of a contact insecticide such as "Black Leaf 40" or "Nicotine Sulfate." Nicotine dusts are also

HOT WATER TREATMENT OF NARCISSI. (DOUCETTE.)

Temperature (F) and time of treatment	Per cent of insects killed		
	M. equestris (Larger fly)	*E. strigatus* (Smaller fly)	*R. hyacinthi* (Bulb mite)
100 deg.— 1 hr.	11.1	14.8	
3 hrs.	60.	87.5	
105 deg.—15 min.	0.0	0.0	Many alive
1 hr.	29.4	92.5	All dead but 2
3 hrs.	100.	100.	No live mites
110 deg.— 5 min.	0.0	0.0	
30 min.	72.2	100.	No live mites
1 hr.	100.	100.	No live mites
114 deg.—10 min.	40.	88.8	
30 min.	100.	100.	
117 deg.—10 min.	50.	100.	No live mites
30 min.	100.	100.	No live mites
120 deg.—10 min.[1]	100.	100.	No live mites
10 min.[2]	50.	90.	Live mites numerous except near surface

[1] Small, moderately soft bulbs.

[2] Large, firm bulbs.

being used at present for the control of such pests.

White grubs, the larvæ of "June bugs," may occasionally cause serious injury by feeding on the roots of bulbs. However, they are not frequently found in sufficient number in the home garden to cause alarm. Wireworms, the larvæ of click-beetles and cutworms, may at times be responsible for damage.

Red spider, (correctly mites), which are decidedly injurious to many garden flowers, phlox in particular, are not especially troublesome to the spring flowering bulbs; these plants will usually have completed their growth by the time the rapid development of the red spider is favored with hot and dry weather.

Diseases

The Botrytis blight is unquestionably one of the most serious diseases of the tulip. It proved to be very destructive in Massachusetts in 1927. A thorough study of this fungus, *Botrytis tulipae* (Libert), has been made by Hopkins. The following material has been adapted from his report. The presence of the disease on the brown outer skin or husk of the bulb is shown by small black bodies; these may also be found on the old dried flower stalk

of the previous season which may remain attached to the bulb. When the skin is removed, affected areas will be frequently found, usually circular in outline and yellow to brown in color; the central part of these areas is usually depressed and may also bear the small black bodies. On the leaves the diseased areas show first as minute, yellowish spots surrounded by a darker water-soaked area. As they enlarge the areas become more depressed, the color changes to a whitish gray with a brownish tinge, with a water-soaked zone about the margin. When conditions are favorable (in wet and dull seasons), these lesions or areas may involve the entire leaf. The affected portions of the flowers are very striking, especially on red flowered varieties; they begin as minute spots, whitish to light brown in color; as they enlarge they turn deeper brown and affect the entire petal, which finally becomes dry and wrinkled. Frequently an entire flower is so injured that it appears to have been blighted, hence the name, "fire disease," of the Dutch. When small flower buds are attacked, they may fail to develop. On the stalk the lesion may extend through the stem, causing it to weaken and fall over; if the diseased section is near the base, the whole plant falls; if higher up, the flower droops.

The best methods of control that can be recommended are the planting of healthy bulbs only, removal and destruction of entire plants when the disease is found in the garden or border, and in the latter case, the planting of bulbs in a different location.

The gray bulb-rot of the tulip, *Rhizoctonia tuliparum* (Klebn), according to Whetzel and Arthur, is a disease which appears to be of relatively little danger to tulip growers in America. This is primarily because of the fact that the disease is seldom carried on dormant bulbs, is apparently not disseminated by spores, and consequently is likely to cause serious injury in only those locations where it has become established in commercial plantings. Therefore, it seems perfectly obvious that the disease will not cause trouble to the home gardener if clean, healthy bulbs are planted. In many instances diseased tulips thought to have been affected with this fungus have rather been injured by the Botrytis blight.

The gray disease of the narcissus is distinct from the gray bulb-rot of the tulip. The former, because of its appearance, would seem to resemble the mosaic diseases. Its presence is indicated by an uneven green color in the foliage, the leaves at times appearing to be almost variegated with yellow. If it is a

mosaic disease, it is probably transmitted from plant to plant by certain insects which feed on the plant juices. The remedy consists chiefly of removing and destroying the diseased plants and keeping insect pests under control.

Grape hyacinth bulbs and crocus corms sometimes carry fungus diseases when they are received by the home gardener; sooner or later the bulbs rot and are a complete loss. It is therefore evident that only healthy bulbs should be planted. Diseased bulbs should preferably be burned.

Other Troubles

It sometimes happens that mature bulbs of any kind fail to produce flowers, even with the best of treatment on the part of the home gardener. This condition is commonly called "blindness" and may be due to various factors, such as heating or improper curing in the storage house, heating in shipment across the ocean, or keeping in too high a temperature previous to planting. When received by the home gardener, bulbs should preferably be kept in a cool, airy cellar until the proper time for planting.

A condition known as "blasting" frequently occurs on the double white poet's narcissus

(*Narcissus albus plenus odoratus*). It is a very late flowering variety that is often found in home gardens, but in many instances the flower buds fail to open. The buds may develop to normal size and never open or they may blast before they are far advanced. Factors which apparently promote this condition are high temperature and dry atmosphere. It is therefore recommended that such bulbs be planted in a shady or partially shaded location where the temperature is cooler and the atmosphere more moist than in the open garden. In the illustration shown this variety is growing in a border which runs north and south and is shaded for the greater part of the morning by apple trees. If one does not have enough bulbs to make the task irksome, snipping off the end of the sheaths with the scissors or fingernails may assist Nature in opening the flowers.

Moles and mice may also be responsible for serious losses of bulbs in the home garden. Without doubt much of the damage that is ascribed to the moles has actually been done by the mice, since moles are not supposed to be herbivorous (feeding on vegetable matter). Calcium cyanide may prove effective in mole and mouse runs but the use of poisoned wheat will doubtless be more effective with the mice.

The following treatment has proved effective in rose gardens and should be equally satisfactory with bulbs. Dissolve an ounce of strychnine or an ounce of sodium cyanide in one gallon of water; allow wheat to soak in this solution from twelve to fifteen hours, and then scatter on the ground in the section of the garden or border where the bulbs are planted. If used in the late fall or early winter, it should assist greatly in ridding the garden of these rodents for one season at least. Of course such materials should not be used if there is danger of the grain being eaten by poultry, birds or the children's pets.

X

AMATEUR TULIP SHOWS

TULIPS provide such a variety of colors and types that they offer excellent material for flower show purposes, in particular for exhibition as cut-flowers. Hyacinths and many other spring flowering bulbs are not suitable for such use; they are much better adapted for growing in pots and pans, being shown as plants. Narcissi possess a wide range of form and other desirable characteristics, such as length and strength of stem and good keeping qualities, but they do not have the variety of color and color combinations that are found among tulips. In a narcissus show yellow would be the predominant color; in a tulip show there can be a riot of color.

It seems advisable to go a step farther and say that a tulip show would preferably be composed of the later flowering types. Being borne on tall, usually erect stems they make better material for arranging as cut-flowers than do the early flowering forms. Also, in the late

flowering group there are more types and more combinations of color which make for greater variety, a very essential feature in a flower show.

There should not be any difficulty in obtaining a hall or a room in which the show may be held. A room in the town or city library, a church vestry, parish hall, a community house, a school room or a grange hall may provide the location. In such places tables on which the flowers may be staged are usually available. Under favorable conditions an outdoor show may prove very satisfactory.

The essential thing is that the show should have the support of some definite organization, a garden club, a woman's club, or a garden section of a woman's club. If there is strong local interest in flowers, a grange or village improvement society might sponsor the exhibit.

Entrants in such a show should be limited to amateurs, individuals who are growing their flowers for pleasure rather than for profit. Commercial florists should not be allowed to compete except in classes among themselves; otherwise it is not just to the amateur. For example, in a class calling for three blooms of a pink Darwin, Mr. X., a commercial grower, may be able to select his blooms from

a lot of two hundred, whereas Mrs. Y. may have to select her flowers from a dozen or twenty-five. The writer calls to mind a country fair where competition in the gladiolus classes, with entries open to all, is now practically confined to one grower, the strictly amateur gardeners having been "scared out." Such cases should be corrected by the authorities in charge by providing classes for both groups.

It is usually desirable to have a rule requiring that all those who are to compete should file their entries with the secretary or the flower show committee at least twenty-four hours before the time when the show is to be opened to the public. This should allow ample time for those in charge to plan the show so that the required amount of table space will be allotted to each class.

The drawing up of the schedule of classes is without doubt the most important of the preparations for a tulip show or any kind of flower show. If the schedule has been carefully thought out in advance, entrants can easily place their blooms in the proper classes and much confusion will be avoided, both in staging and in judging. The author ventures to suggest the schedule given below, which,

with some modifications, has been used by an amateur garden club.

Schedule for a Tulip Show

Variety names should accompany exhibits whenever it is possible.

First, second, and third prize ribbons will be awarded in each class if the exhibits are deemed worthy by the judges. Awards shall not be made if not merited.

Three flowers in one vase shall be required in each entry in Classes 1 through 21.

SECTION I. DARWIN TULIPS

Class 1. White.
Class 2. Light pink.
Class 3. Deep pink or rose, and cerise.
Class 4. Red and scarlet.
Class 5. Lavender.
Class 6. Purple.
Class 7. Yellow. Very rare.
Class 8. Any other color.

SECTION II. MAY-FLOWERING OR COTTAGE TULIPS

Class 9. White.
Class 10. Picotee.
Class 11. Yellow.
Class 12. Pink, rose, and cerise.
Class 13. Red and scarlet.
Class 14. Any other color.

Section III. Miscellaneous Types of Tulips

Class 15. Breeder Tulips.
Class 16. Rose Tulips.
Class 17. Bybloem Tulips.
Class 18. Bizarre Tulips.
Class 19. Rembrandt Tulips.
Class 20. Parrot Tulips.
Class 21. Double Late Tulips (very rare).

Section IV.

Class 22. Collection of four varieties, three blooms of each in a vase.
Class 23. Vase of fifteen blooms of one variety.

Section V.

In the following classes it is understood that tulips shall predominate.

Class 24. Most artistic vase or bowl arrangement of one variety; use of other flowers and foliage permitted.

Class 25. Most artistic vase or bowl arrangement of more than one variety; use of other flowers and foliage permitted.

Class 26. Most artistic basket arrangement of one variety; use of other flowers and foliage permitted.

Class 27. Most artistic basket arrangement of more than one variety; use of other flowers and foliage permitted.

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